SAF-RC-232 100-IU-2 & 100-IU-6 Remaining **Waste Sites – Soil Full Protocol** FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Kathy Wendt H4-21

KW 4/14/14 INITIAL/DATE

COMMENTS:

SDG XP0049 SAF-RC-232

Sample Location: 600-382 Date:

14 April 2014

To:

Washington Closure Hanford Inc. (technical representative)

From:

ELR Consulting

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil Full Protocol - Waste Site

600-382

Subject:

Polyaromatic Hydrocarbon/Herbicide - Data Package No. XP0049-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0049 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1T973	2/4/14	Soil	С	See note 1
J1T974	2/4/14	Soil	С	See note 1
J1T975	2/4/14	Soil	С	See note 1
J1T976	2/4/14	Soil	С	See note 1
J1T977	2/4/14	Soil	С	See note 1
J1T978	2/4/14	Soil	С	See note 1

^{1 -} Polyaromatic Hydrocarbons by 3550B & herbicides by 8151A.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Data Requested by Client

DATA QUALITY OBJECTIVES

Holding Times

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Analytes must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-

detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

Method Blanks

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

Due to matrix spike and matrix spike duplicate recoveries outside QC limits (0% & 0%), all dalapon results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

Precision

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All duplicate results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1T973/J1T978) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria.

Eighteen herbicide results exceeded the RQL. Under the WCH statement of work, no qualification is required. All other analytes met the RQL.

Completeness

Data package No. XP0049 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

Due to matrix spike and matrix spike duplicate recoveries outside QC limits (0% & 0%), all dalapon results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decisionmaking purposes).
- N Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2 Summary of Data Qualification

POLYAROMATIC HYDROCARBON & HERBCIDE DATA QUALIFICATION SUMMARY*

SDG: XP0049	REVIEWER: ELR	Project: 600-382	PAGE_1_OF_1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Dalapon	J	All	MS & MSD recovery

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3 Annotated Laboratory Reports

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Sample ID:

342714001

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

Client Sample ID: J1T973

04-FEB-14 08:20

Receive Date:

07-FEB-14

Collector: Moisture: Client 1.85%

4/13/14

Parameter	Qualifier	Result	DL	RL	Uni	ts DF	Analyst	Date	Time Batch	Method
HPLC-PAH										
8310/3550 PAH Std Ii	st Soil "Dry W	eight Corrected"								
Acenaphthene	ับ	5.08	5.08	16.9	ug/kı	z 1	CWW 0	2/13/14	1146 1365968	1
Acenaphthylene	X	189	5.08	16.9		•				•
Anthracene	U	1.69	1.69	16.9		•				
Benzo(a)anthracene	U	0.542	0.542	1.69	Ψ.	-				
Benzo(a)pyrene	U	0.542	0.542	1.69		•				
Benzo(b)fluoranthene	U	0.542	0.542	1.69		•				
Benzo(ghi)perylene	PX	2.16	0.542	1.69						
Benzo(k)fluoranthene	U	0.271	0.271	0.847						
Chrysene	U	0.542	0.542	1.69		-				
Dibenzo(a,h)anthracene	U	0.542	0.542	1.69	ug/ks	ž 1				
Fluoranthene	U	0.542	0.542	1.69	ug/kg	1				
Fluorene	U	5.08	5.08	16.9						
Indeno(1,2,3-cd)pyrene	X	4.43	0.542	1.69	ug/kg	, l				
Naphthalene	U	5.08	5.08	16.9						
Phenanthrene	U	5.08	5.08	16.9						
Pyrene	U	0.542	0.542	1.69	ug/kg	g 1				
The following Prep M	ethods were pe	erformed:								
Method	Description	1		Analyst	Date	Tim	ie Prej	Batch	1	
SW846 3550B	3550B PAH I	BY HPLC Prep in soil		AXV1	02/11/1	4 1735	1365	967		
The following Analyt	ical Methods v	vere performed:								
Method	Description					Analyst Co	mments			
1	SW846 8310									
Surrogate/Tracer Reco	very Test				Result	Nominal	Recove	rv%	Acceptable L	imits
Decafluorobiphenyl	8310/35 Correcte	50 PAH Std list Soil "Dry	Weight		5870 ug/kg	8470	69		(23%-104%	

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Certificate of Analysis

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

Client SDG: XP0049

RC-232 Soil

Project:

WCHN00213

Report Date: February 14, 2014

Sample ID:

Client Sample ID: J1T974 342714002

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:50

Receive Date:

07-FEB-14

Collector: Moisture:

Client 14.8% Wy (3/14

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst	Date	Time Batch	Method
HPLC-PAH										
8310/3550 PAH Std li	st Soil "Dry W	eight Corrected"								
Acenaphthene	U	5.87	5.87	19.6	ug/kg	; 1	CWW 02	2/13/14	1229 1365968	1
Acenaphthylene	U	5.87	5.87	19.6	i ug/kg	; 1				
Anthracene	U	1.96	1.96	19.6	ug/kg	; 1				
Benzo(a)anthracene	ប	0.626	0.626	1.96	ug/kg	, 1				
Benzo(a)pyrene	U	0.626	0.626	1.96	ug/kg	; 1				
Benzo(b)fluoranthene	U	0.626	0.626	1.96	i ug/kg	; 1				
Benzo(ghi)perylene	J	0.685	0.626	1.96	o ug∕kg	1				
Benzo(k)fluoranthene	U	0.313	0.313	0.978	ug/kg	; I				
Chrysene	U	0.626	0.626	1.96	i ug/kg	, 1				
Dibenzo(a,h)anthracene	U	0.626	0.626	1.96	ug/kg	; 1				
Fluoranthene	J	1.37	0.626	1.9€	i ug/kg	; 1				
Fluorene	U	5.87	5.87	19.6	ug/kg	, 1				
Indeno(1,2,3-cd)pyrene	U	0.626	0.626	1.96	ug/kg	; 1				
Naphthalene	U	5.87	5.87	19.6	o ug∕kg	; 1				
Phenanthrene	U	5.87	5.87	19.6	i ug/kg	; l				
Pyrene	J	1.72	0.626	1.96	ug/kg	1				
The following Prep M	ethods were po	erformed:								
Method	Description	1		Analyst	Date	Tim	e Prej	Batch	1	
SW846 3550B	3550B PAH I	BY HPLC Prep in soil		AXV1	02/11/14	4 1735	1365	967		
The following Analyt	ical Methods v	vere performed:								
Method	Description					Analyst Co	mments			
1	SW846 8310									
Surrogate/Tracer Reco	overy Test				Result	Nominal	Recove	ry%	Acceptable L	imits
Decafluorobiphenyl	8310/35 Correct	50 PAH Std list Soil "Dr ed"	y Weight		5710 ug/kg	9780	58	3.4	(23%-104%))

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Certificate of Analysis

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Client Sample ID: J1T975 Sample ID:

342714003

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 09:20

Receive Date:

07-FEB-14

Collector: Moisture: Client 9.67%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time Batch	Method
HPLC-PAH										
8310/3550 PAH Std li	ist Soil "Dry W	eight Corrected"								
Acenaphthene	Ū	5.53	5.53	18.4	ug/kg	1	CWW 02/	13/14	1435 1365968	į
Acenaphthylene	U	5.53	5.53	18.4	ug/kg	i				
Anthracene	U	1.84	1.84	18.4	ug/kg	1				
Benzo(a)anthracene	U	0.590	0.590	1.84	ug/kg	1				
Benzo(a)pyrene	U	0.590	0.590	1.84	ug/kg	1				
Benzo(b)fluoranthene	U	0.590	0.590	1.84	ug/kg	1				
Benzo(ghi)perylene	U	0.590	0.590	1.84	ug/kg	1				
Benzo(k)fluoranthene	U	0.295	0.295	0.922	ug/kg	1				
Chrysene	U	0.590	0.590	1.84	ug/kg	1				
Dibenzo(a,h)anthracene	U	0.590	0.590	1.84	ug/kg	. 1				
Fluoranthene	U	0.590	0.590	1.84	ug/kg	1				
Fluorene	U	5.53	5.53	18.4	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	0.590	0.590	1.84	ug/kg	1				
Naphthalene	U	5.53	5.53	18.4	ug/kg	1				
Phenanthrene	U	5.53	5.53	18.4	ug/kg	1				
Pyrene	U	0.590	0.590	1.84	ug/kg	1				
The following Prep M	lethods were po	erformed:								
Method	Description	1		Analyst	Date	Tim	e Prep	Batch	1	
SW846 3550B	3550B PAH I	BY HPLC Prep in soil		AXV1	02/11/14	1735	136590	67		
The following Analyt	tical Methods v	vere performed:								
Method	Description					Analyst Co	mments			
1	SW846 8310								***************************************	
Surrogate/Tracer Reco	overy Test			R	Lesult	Nominal	Recovery	y%	Acceptable L	imits
Decafluorobiphenyl	8310/35 Correcte	550 PAH Std list Soil "Dry W	eight	633	30 ug/kg	9220	68.7	7	(23%-104%	

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Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

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MSIN H4-21

Richland, Washington 99354

8310/3550 PAH Std list Soil "Dry Weight

Corrected"

Contact: Project: Joan Kessner

Client SDG: XP0049

Client Sample ID: J1T976

RC-232 Soil

Project:

WCHN00213

Sample ID:

J1T976 342714004

6010 ug/kg

8620

69.7

(23%-104%)

Client ID: WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 09:40

Receive Date:

07-FEB-14

Collector:

Client

Moisture: 3.47%

Parameter	Qualifier	Result	DL	RL	Units	DF A	nalyst Date	Time Batch	Method
HPLC-PAH									
8310/3550 PAH Std lis	t Soil "Dry W	eight Corrected"							
Acenaphthene	U	5.17	5.17	17.2	ug/kg	1 C	WW 02/13/14	1518 1365968	1
Acenaphthylene	U	5.17	5.17	17.2	ug/kg	1			
Anthracene	U	1.72	1.72	17.2	ug/kg	1			
Benzo(a)anthracene	U	0.552	0.552	1.72	ug/kg	1			
Benzo(a)pyrene	JP	1.03	0.552	1.72	ug/kg	1			
Benzo(b)fluoranthene	J	0.926	0.552	1.72	ug/kg	1			
Benzo(ghi)perylene	J	0.859	0.552	1.72	ug/kg	1			
Benzo(k)fluoranthene	U	0.276	0.276	0.862	ug/kg	1			
Chrysene	U	0.552	0.552	1.72	ug/kg	1			
Dibenzo(a,h)anthracene	U	0.552	0.552	1.72	ug/kg	1			
Fluoranthene	J	1.21	0.552	1.72	ug/kg	1			
Fluorene	U	5.17	5.17	17.2	ug/kg	1			
Indeno(1,2,3-cd)pyrene	U	0.552	0.552	1.72	ug/kg	1			
Naphthalene	U	5.17	5.17	17.2	ug/kg	1			
Phenanthrene	U	5.17	5.17	17.2	ug/kg	1			
Pyrene	J	1.06	0.552	1.72	ug/kg	1			
The following Prep Me	thods were pe	rformed:							
Method	Description	l		Analyst	Date	Time	Prep Batch		
SW846 3550B	3550B PAH E	BY HPLC Prep in soil		AXV1	02/11/14	1735	1365967		
The following Analytic	cal Methods w	vere performed:							
Method	Description				A	nalyst Com	ments		
1	SW846 8310					***************************************			
Surrogate/Tracer Recov	ery Test			R	lesult N	ominal I	Recovery%	Acceptable L	imits

Notes:

Decafluorobiphenyl

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Certificate of Analysis

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner RC-232 Soil

Client Sample ID: J1T977

Sample ID:

Matrix:

342714005 SOIL

Collect Date:

04-FEB-14 10:00

Receive Date: Collector:

07-FEB-14 Client

Moisture:

2.76%

Project:

Client ID:

Client SDG: XP0049

WCHN00213

WCHN001

Parameter	Qualifier	Result	DL	RL	Unit	ts DF	Analyst Date	Time Batch	Method
HPLC-PAH									
8310/3550 PAH Std list	t Soil "Dry W	eight Corrected"							
Acenaphthene	U	5.14	5.14	17.	l ug/ks	g 1	CWW 02/13/14	1600 1365968	1
Acenaphthylene	U	5.14	5.14	17.	l ug/kg	į 1			
Anthracene	U	1.71	1.71	17.					
Benzo(a)anthracene	U	0.548	0.548	1.7	l ug/kg	; 1			
Benzo(a)pyrene	U	0.548	0.548	1.7	l ug/kg	, 1			
Benzo(b)fluoranthene	U	0.548	0.548	1.7	l ug∕kg	, 1			
Benzo(ghi)perylene	U	0.548	0.548	1.7	l ug/kg	g l			
Benzo(k)fluoranthene	U	0.274	0.274	0.85	5 ug/kg	, ; 1			
Chrysene	U	0.548	0.548	1.7	l ug∕kg	g 1			
Dibenzo(a,h)anthracene	U	0.548	0.548	1.7	l ug/kg	1			
Fluoranthene	JP	0.652	0.548	1.7	l ug/kg	, 1			
Fluorene	U	5.14	5.14	17.	l ug/kg	g 1			
Indeno(1,2,3-cd)pyrene	U	0.548	0.548	1.7	l ug√kg	g l			
Naphthalene	U	5.14	5.14	17.					
Phenanthrene	U	5.14	5.14	17.	l ug∕kg	g 1			
Pyrene	J	1.01	0.548	1.7	l ug∕kg	g 1			
The following Prep Me	thods were pe	rformed:							
Method	Description			Analyst	Date	Time	e Prep Batc	h	
SW846 3550B	3550B PAH B	Y HPLC Prep in soil		AXVI	02/11/1	4 1735	1365967		
The following Analytic	al Methods w	ere performed:							
Method	Description					Analyst Cor	nments		
l	SW846 8310				***************************************				
Surrogate/Tracer Recov	ery Test				Result	Nominal	Recovery%	Acceptable I	imits
Decafluorobiphenyl	8310/35 Correcte	50 PAH Std list Soil "Dry V d"	Veight		6650 ug/kg	8560	77.7	(23%-104%	o)

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Certificate of Analysis

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Sample ID:

Client Sample ID: J1T978 342714006

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:20

Receive Date:

07-FEB-14

Collector: Moisture:

Client 1.72%

Vy	13	14
v	1 ,	

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst	Date	Time Batch	Method
HPLC-PAH										
8310/3550 PAH Std li	st Soil "Dry W	eight Corrected"								
Acenaphthene	U	5.09	5.09	17.0	ug/kg	1	CWW 02	2/13/14	1848 1365968	1
Acenaphthylene	X	195	5.09	17.0) ug/kg	; 1				
Anthracene	U	1.70	1.70	17.0) ug/kg	, 1				
Benzo(a)anthracene	U	0.543	0.543	1.70) ug/kg	; 1				
Benzo(a)pyrene	U	0.543	0.543	1.79	ug/kg	; 1				
Benzo(b)fluoranthene	U	0.543	0.543	1.70) ug/kg	; 1				
Benzo(ghi)perylene	X	2.02	0.543	1.70) ug/kg	1				
Benzo(k)fluoranthene	U	0.271	0.271	0.84	8 ug/kg	1				
Chrysene	U	0.543	0 543	1.70) ug/kg	; 1				
Dibenzo(a,h)anthracene	U	0.543	0.543	1.70) ug/kg	1				
Fluoranthene	U	0.543	0.543	1.7) ug/kg	: 1				
Fluorene	U	5.09	5.09	17.0) ug/kg	, 1				
Indeno(1,2,3-cd)pyrene	X	4.84	0.543	1.70) ug/kg	; 1				
Naphthalene	U	5.09	5.09	17.) ug/kg	; 1				
Phenanthrene	U	5.09	5.09	17.6) ug/kg	, 1				
Pyrene	U	0.543	0.543	1.70) ug/kg	; 1				
The following Prep M	ethods were pe	erformed:								
Method	Description	1		Analyst	Date	Tin	ie Prej	Batch	1	
SW846 3550B	3550B PAH I	BY HPLC Prep in soil		AXV1	02/11/1	4 1735	1365	967		
The following Analyt	ical Methods v	vere performed:								
Method	Description					Analyst Co	mments			
l	SW846 8310									
Surrogate/Tracer Reco	very Test				Result	Nominal	Recove	ry%	Acceptable I	imits
Decafluorobiphenyl	8310/35 Correct	50 PAH Std list Soil "Dry V	Weight	***************************************	5820 ug/kg	8480	68	3.6	(23%-104%	ó)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 20, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Client Sample ID: J1T973 342714001

Client ID:

WCHN001

Sample ID: Matrix:

SOIL

Collect Date:

04-FEB-14 08:20

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

1.85%

V4/13/14

Parameter	Qualifier	Result	DL	RL	Uni	ts DF	Analys	t Date	Time Batch	Method
Semi-Volatiles-HEF	RB							····		· · · · · · · · · · · · · · · · · · ·
8151A Herbicides S	Soil "Dry Weight	Corrected"								
2,4,5-T	DŬ	16.9	16.9	50.9	ug/kj	g 10	RXE1	02/13/14	0124 1365971	1
2,4,5-TP	DU	16.9	16.9	50.9	-	•				-
2,4-D	DU	16.9	16.9	50.9						
2,4-DB	DU	/ 16.9	16.9	50.9		-				
Dalapon	DTU 🧘	357	357	1020		-				
Dicamba	DU	20.4	20.4	50.9		-				
Dichlorprop	DU	23.0	23.0	50.9		•				
Dinoseb	DU	16.9	16.9	50.9						
MCPA	DU	2340	2340	10200	ug/k	g 10				
MCPP	DU	2040	2040	10200	ug/kį	g 10				
The following Prep	Methods were pe	erformed:								
Method	Description	1		Analyst	Date	Tin	ie Pr	ep Batch	1	***
SW846 8151A	8151A Herbio	ides Prep in Soil		AXV1	02/11/1	4 1740) 136	55970		
The following Anal	lytical Methods v	vere performed:								
Method	Description					Analyst Co	mments			
1	SW846 8151 A	\		****						
Surrogate/Tracer Re	ecovery Test				Result	Nominal	Recov	ery%	Acceptable I	imits
2,4-Dichlorophenylacetic	acid 8151A I	Herbicides Soil "Dry W	eight Corrected"		67.9 ug/kg	102		56.6	(38%-142%	j)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 20, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Sample ID:

Client Sample ID: J1T974 342714002

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:50

Receive Date:

07-FEB-14

Collector: Moisture:

Client

14.8%

W 4/13/14

Parameter	Qualifier	Result	DL	RL	Unit	ts DF	Analyst D	ate Time Batch	Metho
Semi-Volatiles-HE	RB				W-00-17-00-14-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1				
8151A Herbicides	Soil "Dry Weight	Corrected"							
2,4,5-T	DU	19.4	19.4	58.6	ug/kg	10	RXE1 02/13	3/14 0150 1365971	t
2,4,5-TP	DU	19.4	19.4	58.6		•			
2,4-D	DU	19.4	19.4	58.6	ug/kg	10			
2,4-DB	DU _	19.4	19.4	58.6	ug/kg	10			
Dalapon	DTU .	410	410	1170	ug/kg	10			
Dicamba	DU	23.4	23.4	58.6	ug/kg	10			
Dichlorprop	DU	26.5	26.5	58.6	ug/kg	10			
Dinoseb	DU	19.4	19.4	58.6	ug/kg	10			
MCPA	DU	2690	2690	11700	ug/kg	10			
MCPP	DU	2340	2340	11700	ug/kg	g 10			
The following Prep	Methods were pe	erformed:							
Method	Description	1		Analyst	Date	Tim	e Prep B	atch	
SW846 8151A	8151A Herbio	ides Prep in Soil		AXV1	02/11/1	4 1740			
The following Ana	alytical Methods v	vere performed:							
Method	Description					Analyst Co	mments		
l	SW846 8151 A	L							
2	SW846 8151 A								
Surrogate/Tracer R	lecovery Test				Result	Nominal	Recovery	% Acceptable I	Limits
2,4-Dichlorophenylacet	ic acid 8151A I	lerbicides Soil "Dry	Weight Corrected*		112 ug/kg	117	95.7	(38%-142%	

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Certificate of Analysis

Report Date: February 20, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Contact:

Richland, Washington 99354 Joan Kessner

Project:

Client SDG: XP0049

Client Sample ID: J1T975

RC-232 Soil

Project: Client ID: WCHN00213 WCHN001

Sample ID:

342714003

Matrix:

SOIL

Collect Date: Receive Date: 04-FEB-14 09:20 07-FEB-14

Collector:

Client

Moisture:

9.67%

Parameter	Qualifier	Result	DL	RL	Units	DF A	Analyst	Date	Time Batch	Method
Semi-Volatiles-HE	ERB									
8151A Herbicides	Soil "Dry Weight (Corrected"								
2,4,5-T	DU	18.4	18.4	55.3	ug/kg	10 F	RXEI 02	2/13/14	0216 1365971	1
2,4,5-TP	DU	18.4	18.4	55.3	ug/kg	10				-
2,4-D	DU	18.4	18.4	55.3	ug/kg	10				
2,4-DB	DU	18.4	18.4	55.3	ug/kg	10				
Dalapon	DTU (387	387	1110	ug/kg	10				
Dicamba	DU	22.1	22.1	55.3	ug/kg	10				
Dichlorprop	DU	25.0	25.0	55.3	ug/kg	10				
Dinoseb	DU	18.4	18.4	55.3	ug/kg	10				
MCPA	DU	2540	2540	11100	ug/kg	10				
MCPP	DU	2210	2210	11100	ug/kg	10				
The following Prep	p Methods were per	formed:								
Method	Description			Analyst	Date	Time	Prep	Batch		
SW846 8151A	8151A Herbici	des Prep in Soil		AXVI	02/11/14	1740	1365	970		
ent c.u	1 . 13 . 13									

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8151A	
2	SW846 8151A	
	_	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
2,4-Dichlorophenylacetic acid	8151A Herbicides Soil "Dry Weight Corrected"	110 ug/kg	111	99.7	(38%-142%)

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Certificate of Analysis

Report Date: February 20, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Client ID:

Project:

RC-232 Soil

Project:

WCHN00213

WCHN001

Sample ID:

Client Sample ID: J1T976 342714004

SOIL

Matrix:

Collect Date:

04-FEB-14 09:40

Receive Date: Collector:

07-FEB-14 Client

Moisture:

3.47%

Parameter	Qualifier	Result	DL	RL	Units	DF A	Analyst	Date	Time	e Batch	Method
Semi-Volatiles-HI	ERB	adautikkin (1964 % talapitakitikatikatikatikin (1964 % taningan nyaétan (1964 % 1964 a a a ay			The state of the s						
8151A Herbicides	Soil "Dry Weight	Corrected"									
2,4,5-T	DÜ	17.2	17.2	51.8	ug/kg	10 F	RXEI 0	2/13/14	0335	1365971	1
2,4,5-TP	DU	17.2	17.2	51.8	ug/kg	10					
2,4-D	DU	17.2	17.2	51.8	ug/kg	10					
2,4-DB	DU	17.2	17.2	51.8	ug/kg	10					
Dalapon	DTU ,	363	363	1040	ug/kg	10					
Dicamba	DU	20.7	20.7	51.8	ug/kg	10					
Dichlorprop	DU	23.4	23.4	51.8	ug/kg	10					
Dinoseb	DU	17.2	17.2	51.8	ug/kg	10					
MCPA	DU	2380	2380	10400	ug/kg	10					
MCPP	DU	2070	2070	10400	ug/kg	10					
The following Pre	p Methods were pe	erformed:									
Method	Description	1		Analyst	Date	Time	Pre	p Batch	h		-
SW846 8151A	8151A Herbio	cides Prep in Soil		AXV1	02/11/14	1740	1365	5970			
The following An	alytical Methods v	vere performed:									
Method	Description				An	alyst Com	ments				
	~~~~~~~~~~										

1 SW	846 8151A				
2 SW	846 8151A				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
2,4-Dichlorophenylacetic acid	8151A Herbicides Soil "Dry Weight Corrected"	108 ug/kg	104	104	(38%-142%)

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## **Certificate of Analysis**

Report Date: February 20, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project: Client ID: WCHN00213 WCHN001

Client Sample ID: J1T977

Sample ID:

342714005 SOIL

Matrix: Collect Date:

04-FEB-14 10:00

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

2.76%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time Batch	Method
Semi-Volatiles-HE	ERB	4-90 00 to 100 00 00 00 00 00 00 00 00 00 00 00 00								
8151A Herbicides	Soil "Dry Weight	Corrected"								
2,4,5-T	DÜ	17.0	17.0	51.3	ug/kg	10	RXE1 0	2/13/14	0402 1365971	1
2,4,5-TP	DU	17.0	17.0	51.3	ug/kg	10				
2,4-D	DU	17.0	17.0	51.3	ug/kg	10				
2,4-DB	DU	<b>17.0</b>	17.0	51.3	ug/kg	10				
Dalapon	DTU .	359	359	1030	ug/kg	10				
Dicamba	DU	20.5	20.5	51.3	ug/kg	10				
Dichlorprop	DU	23.2	23.2	51.3	ug/kg	10				
Dinoseb	DU	17.0	17.0	51.3	ug/kg	10				
MCPA	DU	2360	2360	10300	ug/kg	10				
MCPP	DU	2050	2050	10300	ug/kg	10				
The following Prep	p Methods were pe	erformed:								
Method	Description	1		Analyst	Date	Time	e Pre	Batch	1	
SW846 8151A	8151A Herbio	ides Prep in Soil	·	AXVI	02/11/14	1740	1365	970		

The following	; Analytical	Methods	were	performed:
---------------	--------------	---------	------	------------

Method	Description		Analyst Co	mments	
1	SW846 8151A				
2	SW846 8151A				
Surrogate/Trace	er Recovery Test	Result	Nominal	Recovery%	Acceptable Limits

2,4-Dichlorophenylacetic acid

8151A Herbicides Soil "Dry Weight Corrected"

108 ug/kg

Nominal 103

Acceptable Limits 105 (38%-142%)

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## **Certificate of Analysis**

Report Date: February 20, 2014

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

RC-232 Soil

Client Sample ID: J1T978 Sample ID:

342714006

Matrix:

SOIL

Collect Date: Receive Date: 04-FEB-14 08:20 07-FEB-14

Collector:

Client

Moisture:

1.72%

Client SDG: XP0049

Project: Client ID: WCHN00213

WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time Batch	Method
Semi-Volatiles-HE	ERB									
8151A Herbicides	Soil "Dry Weight (	Corrected"								
2,4,5-T	DÜ	16.9	16.9	50.8	ug/kg	10	RXEI 0	2/13/14	0428 1365971	1
2,4,5-TP	DU	16.9	16.9	50.8	ug/kg	10	TOLD! O.	27 1 37 1 4	0428 1303771	1
2,4-D	DU	16.9	16.9	50.8	ug/kg	10				
2,4-DB	DU _	16.9	16.9	50.8	ug/kg	10				
Dalapon	C UTO	356	356	1020	ug/kg	10				
Dicamba	DU	20.3	20.3	50.8	ug/kg	10				
Dichlorprop	DU	23.0	23.0	50.8	ug/kg	10				
Dinoseb	DU	16.9	16.9	50.8	ug/kg	10				
MCPA	DU	2340	2340	10200	ug/kg	10				
MCPP	ĐU	2030	2030	10200	ug/kg	10				
The following Prep	p Methods were per	rformed:			0 0					
Method	Description			Analyst	Date	Time	e Pret	Batch		
SW846 8151A	8151A Herbici	des Prep in Soil		AXV1	02/11/14	1740	1365			

The following Analytical Methods were performed:

Method	Description
1	CW/946 9151 A

l		SW846	8151A	
_				

Surrogate/Tracer Recovery	Test	
2,4-Dichlorophenylacetic acid	8151A	Herbicides Soil "Dry Weight Corrected"

Analyst	Comments

Result	Nominal	Recovery%	Acceptable Limits
74.4 ug/kg	102	73.2	(38%-142%)

## Appendix 4

**Laboratory Narrative and Chain-of-Custody Documentation** 

#### Herbicide Case Narrative WC-HANFORD, INC. (WCHN) SDG XP0049

#### Method/Analysis Information

Procedure: Analysis of Chlorophenoxy Acid Herbicides by ECD

Analytical Method: SW846 8151A

Prep Method: SW846 8151A

Analytical Batch Number: 1365971

Prep Batch Number: 1365970

#### Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8151A:

Sample ID	Client ID
342714001	J1T973
342714002	J1T974
342714003	J1T975
342714004	J1T976
342714005	J1T977
342714006	J1T978
1203034044	Method Blank (MB)
1203034045	Laboratory Control Sample (LCS)
1203034046	342714003(J1T975) Matrix Spike (MS)
1203034047	342714004(J1T976) Matrix Spike Duplicate (MSD)
	342714001 342714002 342714003 342714004 342714005 342714006 1203034044 1203034045 1203034046

The samples in this SDG were analyzed on a "dry weight" basis.

#### Preparation/Analytical Method Verification

#### SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-011 REV# 21.

Raw data reports are processed and reviewed by the analyst using ChemStation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

#### Calibration Information

#### **Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

#### Continuing Calibration Verification (CCV) Requirements

All calibration verification standards (CVS, ICV, or CCV) requirements have not been met for this SDG. The

bracketing standard failed with a negative and/or positive bias for several target analytes. All samples were re-analyzed. Since the bracketing standard failed in a similar manner, the standard failure was attributed to matrix interference. All analytes were within the established retention time windows for this method.

#### **Quality Control (QC) Information**

#### Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

#### Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

#### Laboratory Control Sample (LCS) Recovery

The LCS(1203034045) did not meet spike recovery acceptance criteria for Dinoseb. Since there were no target analytes detected in the associated client samples, the biased high spike recovery had no adverse impact on the data and the results have been reported.

#### **QC Sample Designation**

Sample 342714003 (J1T975) was selected for analysis as the matrix spike and matrix spike duplicate.

#### Matrix Spike (MS) Recovery Statement

The MS(1203034046(J1T975)) did not meet spike recovery acceptance criteria for Dalapon. The MS was analyzed at a dilution, along with the parent sample and MSD, due to the viscous nature of the extract. As a result, Dalapon was diluted out of the acceptance criteria and the data results have been reported.

#### Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were within the established acceptance limits for the reported spike analytes.

#### MS/MSD Relative Percent Difference (RPD) Statement

The MS(1203034046(J1T975))/MSD(1203034047(J1T976)) did not meet RPD acceptance criteria for Dalapon. The MS was analyzed at a dilution, along with the parent sample and MSD, due to the viscous nature of the extract. The RPD failure was attributed to Dalapon being diluted out of the acceptance limits in the MS. The data results have been reported.

#### **Technical Information**

#### **Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

#### Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported target analyte concentrations were confirmed on a dissimilar column.

#### Sample Dilutions

Samples 1203034046 (J1T975), 1203034047 (J1T976), 342714001 (J1T973), 342714002 (J1T974), 342714003 (J1T975), 342714004 (J1T976), 342714005 (J1T977) and 342714006 (J1T978) were analyzed at a dilution due to the viscous nature of the extracts.

#### Sample Re-extraction/Re-analysis

Samples 1203034044 (MB), 1203034045 (LCS), 1203034046 (J1T975), 1203034047 (J1T976), 342714001 (J1T973), 342714002 (J1T974), 342714003 (J1T975), 342714004 (J1T976), 342714005 (J1T977) and 342714006 (J1T978) were re-analyzed in order to confirm ending check standard (CCV) failure. The original

data results have been reported and the re-analysis data are located in the Miscellaneous Section.

#### Miscellaneous Information

#### **Electronic Package Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

#### Data Exception (DER) Documentation

The following DER was generated for this SDG: 1267769.

#### **Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this Herbicide fraction.

#### **Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

The higher results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS and MSD are from the same analytical column as the parent sample.

Due to rounding differences in the calculation between the forms, the data reported in the Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

Due to software issue, the raw data may not correctly display the updated SPC limits. Please see Sample Data Summary Report and Surrogate Recovery Report for the correct surrogate acceptance limits.

#### System Configuration

The Semi-Volatiles-HERB analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD3A.I_1	Agilent 7890A GC	HP6890 Series	Rtx-CLP	30m x 0.25mm, 0.25um
	with duel uECD	ECD	I	(Rtx-CLPesticide)
ECD3A.I_2	Agilent 7890A GC	HP6890 Series	Rtx-CLP	30m x 0.25mm, 0.20um
	with duel uECD	ECD	II	(Rtx-CLPesticideII)

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DER Report No.: 1267769

Revision No.: 3

		TION REPORT							
	<b>Division:</b> Industrial	Quality Criteria: Specifications	Type: Process						
	Test / Method: SW846 8151A	Matrix Type: Solid	Client Code: WCHN						
	Sample Numbers: See Below								
otentially affected work order(s)(SD pplication issues: ailed Recovery for MS/PS ailed RPD for MS/MSD, or PS/PSD	G): 342714(XP0049)								
ailed Recovery for LCS/LCSD									
pecification and Requirements xception Description:		DER Disposition:							
<ol> <li>The LCS(1203034045) did not mee for Dinoseb.</li> <li>The MS(1203034046) did not meet for Dalapon.</li> </ol>	, , , , , , , , , , , , , , , , , , ,	1. Since there were no target analytes detected in the associated client samples, the biased high spike recovery had no adverse impact on the data and the results have been reported.  2. The MS was analyzed at a dilution, along with the parent sample and MSD, due to the viscous nature of the extract. As a result, Dalapon was diluted out of the acceptance criteria and the data results have been reported.							
3. The MS(1203034046)/MSD(120303 acceptance criteria for Dalapon.	4047) did not meet RPD	MSD, due to the viscous nat	a dilution, along with the parent sample and ure of the extract. The RPD failure was diluted out of the acceptance limits in the M reported.						
riginator's Name;	· ·	Data Validator/Group Lead	۵۲۰						

Page 96 of 149

Lioyd O Fox

14-FEB-14

Barbara Bailey

20-FEB-14

Washington (	Closure Hant	ord CH/	AIN OF CUST	ODY/S	SAMPL	E ANA	LYSI	S REQU	EST	RC-2	32-075	Page 1	af2
			Company Contact Telephone No. Project Coordin Joan Kessner 375-4688 KESSNER,							Price Code	88	Data Ti	urnaround
Project Designation 100-IU-2 & 100-IU-6 Rem	ng Location -382 Subsites		7000	•		SAF No. RC-232		7 D	ay				
	12-016	1	ogbook Na. 1666-01		COA 0603822	000		Method of Ship Commerica		- fed	٤x		
Shipped To GEL Laboratories Charlst	on	Offsite	Property No. A1	3/0	49			Bill of Lading/A		see 05	PC		•
Other Labs Shipped To			Preservation	Cool 4C	Cool 4C	Coal 4C	Cool 40	Cool 4C					
,			Type of Container	G/P	aG	aG	aG	æG					
POSSIBLE SAMPLE HAZ	ZARDS/REMARKS		No. of Container(s)	1	1	1	.1	1					
None			Volume	125mL	125mL	125mL	250mL	125mL					
Special Handling and/or	storage 3714		Sample Analysis	See item (1) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 5310	Pesticider 8081; Chlo Herbicider EPA8151	PC8s - 6082					
Sample No.	Matrix	Sample Date	Sample Time		med 12 Ca	100 H 100		3 3 2 5	Marie III		性計算程	が変わった	30 P. (1)
- J1T973	SOIL .	2 - 4 - 14	0820	×	×	X	X	X					
-J1T974	SOIL	2.4.14	0850	x	x	X	X	X					
· J1T975	SOIL	2.4.14	0920	X	x	×	X	X					
-J1T976	SOIL	2-4-14	0840	X	x	X	к	x					
-J1T977	SOIL	2.4.14	1000	X	X	X	X	×					
Relinquished By/Removed From  Relinquished By/Removed From	(1) l Calc	ium, Chromiu nium, Silicon,	010TR (Clo m, Cobalt,	ose-out List) (Alur Copper, Iron, La dium, Vanadium,	ad, Magne	sium, Mangane	se, Molybdenu						
DISPOSITION WCH-EE-011		Dispos	ed By Date/1									· · · · · · · · · · · · · · · · · · ·	

FITETC

Washington Closure Hanford				HAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST RC-232-075 Page 2 of 2										2 of 2
Collector JOHNSON, BRADY			Company Contact Telephone No. Project Coordinator Joan Kessner 375-4688 KESSNER, JH								Price Code		Data Turnaround	
Project Designation 3 100-IU-2 & 100-IU-6 Remaining Waste Sites				Location 32 Subsites					SAF No. RC-232		8B		7 day	
Ice Chest No. WCH -	12-014	P	leld Log EL-16	book No. 66-01		COA 0603822	000		Method of Shipr Commerical		- fec	124		•
Shipped To GEL Laboratories Charlsto	n	C	offsite Pr	operty No. A 13/	049	)			Bill of Lading/A	ir Bill No.	205	PC.		<b>-</b>
Other Labs Shipped To		3		Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 40	Cool 4C					
				Type of Container	G/P	aG	aG	aG	øG					
POSSIBLE SAMPLE HAZ	ARDS/REMARKS			No. of Container(s)	1	1	1	1	1					
None				Volume	125mL	125mL	125mL	250mL	125mL					
Special Handling and/or s	Storage 714			Sample Analysis	See item (1) in Special	TPH-Diesel Range - WTPH-D +	PAHs - 8310	Pesticide 8081; Chic Herbicide EPA815	PCBs - 8082	,				
Sample No.	Matrix	Sample	Date	Sample Time	游台级	NA MA			THE PARTY				<b>建</b> 设计	Met.
-J1T978	SOIL	て・4・	14	0820	×	X	X	×	×					
J1T979	SOIL	2.4.	14	0812	x					- 2-1	1+14an	M5		
Reinquished By/Removed From Date/Time Received By/Stored In Date/Time 1970  Reinquished By/Removed From Date/Time Received By/Stored In Date/Time 1970  Refuguished By/Removed From Date/Time Received By/Stored In Date/Time 1970  Reinquished By/Removed From Date/Time Received By/Stored In Date/Time 1970  Reinquished By/Removed From Date/Time 1970  Received By/Stored In Date/Time 1970  Re						(1) I Calc Selection (1) (1) (1) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	ium, Chromius	010TR (Clo	i ose-out List) (Alur Copper, Iron, Lea dium, Vanedium, i	d, Magnes	ium, Manganes	ie, Molybdenu	Hium, Boron, m, Nickel, Pc	Cadmium, tlasskum.
DISPOSITION WCH-FE-011			UISPOSED	by Dete/T	sne .		XPOC	149	1		4-00 <u>1</u>			

#### **HPLC-PAH** WC-HANFORD, INC. (WCHN) **SDG XP0049**

#### Method/Analysis Information

Procedure:

Polynuclear Aromatic Hydrocarbons

Analytical Method:

SW846 8310

Prep Method:

SW846 3550B

Analytical Batch Number: 1365968 Prep Batch Number:

1365967

#### Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8310:

Sample ID	Client ID
342714001	J1T973
342714002	J1T974
342714003	J1T975
342714004	J1T976
342714005	J1T977
342714006	J1T978
1203034040	Method Blank (MB)
1203034041	Laboratory Control Sample (LCS)
1203034042	342714002(J1T974) Matrix Spike (MS)
1203034043	342714002(J1T974) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

#### Preparation/Analytical Method Verification

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP).

The data discussed in this narrative has been analyzed in accordance with GL-OA-E-030 REV# 15.

Raw data reports are processed and reviewed by the analyst using the Target software package. False positives have been removed from the Target quantitation reports per standard operating procedures (SOP) section 18.0.

#### Calibration Information

Due to software limitations, the files displayed at the beginning of the Form 6 are only the last files uploaded for each individual level. A complete listing of all files used in the current ICAL are shown on the Calibration History that is included with each Level 4 or higher package. The last file by date in each level is the one currently uploaded for that level.

The linear equation used in Target and indicated on the initial calibration summary form is not a conventional linear equation (slope intercept formula) and does not match the equation found in SW-846 method 8000B. The x and y axes are inversed in Target, so that the instrument response is treated as the independent variable (x) and the concentration ratio is treated as the dependent variable (y). The equation used in Target to calculate sample results is adjusted to account for the linear equation inversion and reciprocal slope. The adjusted calculation has been independently verified to produce valid results.

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **CCV** Requirements

All associated calibration verification standards (ICV or CCV) met the acceptance criteria.

#### Quality Control (QC) Information

#### Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

#### Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

#### Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

#### QC Sample Designation

Client sample 342714002 (J1T974) was chosen for matrix spike and matrix spike duplicate analysis.

#### Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

#### Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries were within the established acceptance limits.

#### MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

#### **Technical Information:**

#### **Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

#### Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

#### Sample Dilutions

The samples in this SDG did not require dilutions.

#### Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

#### Miscellaneous Information:

#### Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

A data exception report (DER) was not generated for this SDG.

#### **Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

#### **Additional Comments**

The Form 8 is used only as a sequence of the analysis.

One or more analytes were detected on both columns or detectors that indicated an acceptable peak within the retention time window and acceptable concentration match in samples 342714001 (J1T973) and 342714006 (J1T978). Although method criteria have been satisfied for reporting a positive result for these analytes, the result is considered a false positive due to matrix interference and/or comparison to the DAD generated spectrum and is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with an 'X' qualifier.

One or more analytes were detected whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference or RPD) in samples 342714001 (J1T973), 342714004 (J1T976) and 342714005 (J1T977). Because both columns or detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference or RPD between the two columns, it is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with a 'P' qualifier. Those analytes reported with a percent difference or RPD greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material.

#### **Electronic Package Comment**

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data and package. The data validator will always sign and date the case narrative.

Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

#### System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for Polynuclear Aromatic Hydrocarbons analyses.

The chromatographic hardware system consists of a HP Model 1100 HPLC with programmable gradient pumping and a 100 uL loop injector.

The HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitors absorbance at the following five wavelengths: 1) 224 nm; 2) 250 nm; 3) 270 nm; 4) 234 nm; 5) 300 nm.

The HPLC 1100 is also coupled to a HP Model G1321A Fluorescence Detector in series which monitors the following varying excitations and emissions 1) EX 230 nm EM 330 nm; 2) EX 210 nm EM 314 nm; 3) EX 250 nm EM 368 nm; 4) EX 237 nm EM 440 nm; 5) EX 277 nm EM 376 nm; 6) EX 255 nm EM 420 nm; 7) EX 230 nm EM 453 nm.

The Diode Array UV detector is used as the primary detector and the Fluorescence Detector is used as the confirmation detector. All results are reported from the primary Diode Array UV detector.

The HPLC system is identified with a designation of HPLC E in the raw data printouts.

#### Chromatographic Columns

Chromatographic separation of Polynuclear Aromatic Hydrocarbons is accomplished through analysis on the following reversed phase columns:

Phenomenex: Luna C18 (2), 100 A, 250 mm x 4.6 mm containing 5 um size particle.

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Washington C	Closure Hanf	ord CH	AIN OF CUST	ODY/S	SAMPL	E ANA	LYSI	S REQUI	EST	RC-23	32-075	Page 1	1 of 2
Collector JOHNSON, BRADY			my Contact	Tel	ephone No.			Project Coordina KESSNER, J	tor	Price Code	Price Code 8B Data Turnaro		umaround
Project Designation 100-IU-2 & 100-IU-6 Rema	aining Waste Sites	Sampli	n Kessner ng Location -382 Subsites	37:	5-4688			SAF No. RC-232		7 Day		¥	
	12-016		ogbook Na. 1666-01		COA 0603822	000		Method of Shipm Commerical		- Fed	EX		
Shipped To GEL Laboratories Charlsto	on	Offsite	Property No. A/	3/0	49			Bill of Lading/Air	Bill No.	see 05	PC		
Other Labs Shipped To				Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C					
NA			Preservation	C0014C	Cool ac	Cool 4C	100140	Local 4C		-			
	· · · · · · · · · · · · · · · · · · ·		Type of Container	G/P	aG	aĢ	aG.	eG					
POSSIBLE SAMPLE HAZ	ARDS/REMARKS		No. of Container(s)	1	1	1	.1	1					
None		٠	Volume	125mL	125mL	125mL	250mL	125mL					
Special Handling and/or cool 4c 3 4c	Storage 3714		Sample Analysis	See item (1) in Special Instructions	TPH-Dissel Range - WTPH-D +	PAHs - 8310	Pesticider 8081; Chio Herbicider EPA8151	ro- PC8s - 6082					
Sample No.	Matrix	Sample Date	Sample Time	<b>经产品</b>	品等 對	通知能力量		A SHEET SHEET			数据分类	LESS CAPTURE	winer los
J1T973	SOIL .	2.4.14	0820	×	×	X	X	X					
-J1T974	SOIL	2.4.14	0850	X	X	X	X	X					
· J1T975	SOIL	2.4.14	0920	X	x	×	×	X					
-J1T976	SOIL	2-4-14	0940	X	×	X	×	X.					
-J1T977	SOIL	1 4 14	1000	X	X	×	×	×	100000000000000000000000000000000000000				
CHAIN OF PO  Relinquished By/Removed From  Relinquished By/Removed From  Relinquished By/Removed From  Chair	Date/Time  2-4/4  Dete/Time  1535  14 Dete/Time  1036  2-5-14  Dete/Time  02014  Date/Time	Received By/Store  Received By/Store  Received By/Store  Received By/Store  Received By/Store	din DetaTime  2-4-14  din DateTime  title frdg  din DetaTime  2-5-14  din DetaTime  Ex  din DetaTime  DetaTime  DetaTime  DetaTime	7530 1530 2-4-10 102-5 2-7-1 09:	(1) M Calco Selection	ium, Chromiui nium, Silicon,	010TR (Clo m, Cobalt,	se-out List) (Alumi Copper, Iron, Leac ium, Vanadium, 2	i, Magnes	sium, Manganes	e, Molybdenu /) (Mercury)	Itum, Boron, (m. Nickel, Por EVIEWED EV 2000 VIACO CATE	tassium,
PINAL SAMPLE Disposal Methal D	nod	Dispo	sed By Date/1	ime				100 TO THE TOTAL TOTAL TO THE THE TOTAL TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTA					

FITETC

Washington C	losure Hanf	ord CH	AIN OF CUST	ODY/S	AMPL	E ANA	LYS	IS REQU	EST	RC-23	2-075	Page 2	of 2
Collector JOHNSON, BRADY		Compa	Company Contact Telephone No. Joan Kessner 375-4688							rice Code		Data Turnaround	
Project Designation S 100-IU-2 & 100-IU-6 Remaining Waste Sites			ng Location -382 Subsites					SAF No. RC-232		8B		1 a	ay.
Ice Chest No. WCH -	12-016	Field L EL-	ogbook No. 1666-01	(	COA 0603822	000		Method of Shipn Commerical		- Fea	EX		
Shipped To GEL Laboratories Charlsto	on	Offsite	Property No. A 13/	049	}			Bill of Lading/Al		e 05	DC.		
Other Labs Shipped To			Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4	C Cool 4C					
			Type of Container	GÆ	aG	aG	aG	øG					
POSSIBLE SAMPLE HAZ	ARDS/REMARKS		No. of Container(s)	1	1	1	1.	1					
None			Volume	125mL	125mL	125mL	250m	L 125mL					
Special Handling and/or cool 4c	Storage		Sample Analysis	See item (1) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	Pesticid 8081; Ch Herbicid EPA81	loro- es - PCBs - 8082					
Sample No.	Matrix	Sample Dat	e Sample Time		陸級機		でからませ		BM 音響	<b>计</b> 写如此		最後全	
- J1T978	SOIL	2.4.14	0820	×	X	X	×	x					
J1T979	SOIL	2.4.14	0812	×	-			1	- 2-4	14an	M5		
							-	1		1			
Relinquished By/Removed From	Date/Time    2-4-14    Date/Time   2-5-14    Date/Time   2-5-14    Date/Time   103    Date/Time   103    Date/Time   20714   0400     Date/Time   0400   0400     Date/Time   0400   0400     Date/Time   0400   0400   0400     Date/Time   0400   0400   0400   0400   0400     Date/Time   0400   0400   0400   0400   0400   0400   0400     Date/Time   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   0400   040	Received By/Stor	B. Fahrbe estimated by 2-4-14 and 12-4-14	2-4-14 2-4-14 102 S	114 Sales Sa	sium, Chromiu Anium, Silicon,	D10TR (C m, Cobal Silver, S	Close-out List) (Alur t, Copper, Iron, Lei oofium, Vanadium,	ad, Magnesi	um, Manganes	e, Molybdenu	itum, Boron, ( m, Nickel, Po	Ladmium, tassium,
DISPOSITION						XPOC	140	1					

# Appendix 5 Data Validation Supporting Documentation

VALIDATION LEVEL:	A	В	(c)	D	E
PROJECT:	600-37	2	DATA PACKAG	E: XPOO	45
VALIDATOR:	PLR	LAB: Cy C	<u>: (</u>	DATE:	13/14
			SDG:	(POO49	•
		ANALYSES	PERFORMED		
8015	8021	8141	8151	8315	(8310)
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MAT	RIX:	I.————————————————————————————————————	L		
21797	3 317	574 1	17975	11570	
liter	7 117	17 ×		011	
1117/	1 01				
					5001
Technical verificat	ACKAGE COMPI	oresent?			Yes No N/A
2. INSTRU	MENT TUNING A	ND CALIBRATIO	ON (Levels D and I	Ξ)	
Initial calibrations	acceptable?		·····		Yes No /N/A
Continuing calibrat	tions acceptable?				Yes $No \int N/A$
					Yes No N/A
					i /
	acceptable?	••••••	•••••	••••••	Yes Nd N/
Comments:				·	
			<del></del>		

3.	BLANKS (Levels B, C, D, and E)			/	
Calib	ration blanks analyzed? (Levels D, E)		Yes	No	2# <del>*</del>
Calib	ration blank results acceptable? (Levels D, E)		<del></del>	No (	N/A)
Laboi	ratory blanks analyzed?		('Ve)	) No	N/A
Labo	ratory blank results acceptable?		Yes)	No	N/A
Field/	/trip blanks analyzed? (Levels C, D, E)		Ye6	No	N/A
Field	trip blank results acceptable? (Levels C, D, E)		Yes	Nd	NA.
Trans	scription/calculation errors? (Levels D, E)		Yes	No	
Comi	ments:	No_	MB		
4.	ACCURACY (Levels C, D, and E)			}	
	ogates/system monitoring compounds analyzed?				N/A
	ogate/system monitoring compound recoveries acceptable?				
	ogates traceable? (Levels D, E)				$x \wedge x$
	ogates expired? (Levels D, E)				
MS/I	MSD samples analyzed?		Yes	No	N/A
MS/I	MSD results acceptable?		Y&s	No	N/A
MS/I	MSD standards NIST traceable? (Levels D, E)		Yes	Nq	N/A
MS/I	MSD standards expired? (Levels D, E)		Yes	No '	WA
LCS	/BSS samples analyzed?		Yes	) No	N/A
LCS	/BSS results acceptable?		Ye	No	N/A
Stan	dards traceable? (Levels D, E)	***************************************	Yes	NO	M
Stan	dards expired? (Levels D, E)		Yes	Nd	M
Tran	scription/calculation errors? (Levels D, E)		Yes	No	M
Perfe	ormance audit sample(s) analyzed?		Yes	No	)N/A
			`		// \
Com	ormance audit sample results acceptable?	07, 40	12 ~ 5	<u>a</u>	<u>~</u>
	ró	.0	P.4.5		
		NO	Y <b>/</b> 4- )		

5.	PRECISION (Levels C, D, and E)		
Duplio	cate RPD values acceptable?	(	o N/A
Duplio	cate results acceptable?	(Yes) N	o N/A
MS/M	ISD standards NIST traceable? (Levels D, E)	Yes N	6 NA
MS/M	ISD standards expired? (Levels D, E)	Yes N	10 (N/A)
Field o	duplicate RPD values acceptable?	(Yes)N	lo N/A
Field s	split RPD values acceptable?	Yes N	10 DHA)
Transo	cription/calculation errors? (Levels D, E)	Yes N	10( N/A)
Comn	nents:		
<del></del>			
6.	HOLDING TIMES (all levels)		
-	les properly preserved?		lo N/A
Samp	le holding times acceptable?		lo N/A
Comn	nents:		

8. COMPOUND IDENTIFICATION, QUANTITATION, AND DETECTION LIMITS (all	
levels)	
resums reported for an requisitor analysis	lo N/A
Results supported in the raw data? (Levels D, E)	7
Samples properly prepared? (Levels D, E)	10 (M/A)
	lo) N/A
Transcription/calculation errors? (Levels D, E)	IO(N/A
Comments:	
THE THEIM !!! - Iterhier and	
	<del></del>
9. SAMPLE CLEANUP (Levels D and E)	
Fluoricil ® (or other aborbant) cleanup performed?	Id/N/A
Lot check performed?Yes N	Jo N/A
Check recoveries aceptable?	JA N/A
Check materials traceable? Yes N	O N/A
Check materials Expired?Yes	lo N/A
Analytical batch QC given similar cleanup?	No N/A
Transcription/Calculation Errors?	O N/A
Comments:	$\rightarrow$
·	

## Appendix 6

Additional Documentation Requested by Client

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

## **QC Summary**

Report Date: February 14, 2014

Page 1 of 4

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder: 342714

Client SDG: XP0049

Project Description: RC-232 Soil

Workorder: 342714	Client SDG: XP0049	•	Proj	ect Descrip	tion: RC-2	232 Soil			
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH Batch 1365968			<b></b>						
QC1203034041 LCS Acenaphthene	1670		1280	ug/kg		76.8	(58%-99%)	CWW	02/13/14 11:04
Acenaphthylene	1670		1270	ug/kg		76.5	(58%-98%)	ı	
Anthracene	1670		1490	ug/kg		89.4	(63%-94%)	1	
Benzo(a)anthracene	167		143	ug/kg		85.7	(73%-98%)	ı	
Benzo(a)pyrene	167		134	ug/kg		80.7	(63%-99%)	ı	
Benzo(b)fluoranthene	167		140	ug/kg		84	(70%-130%)	)	
Benzo(ghi)perylene	167		138	ug/kg		83.1	(70%-130%)	)	
Benzo(k)fluoranthene	83.3		65.1	ug/kg		78.2	(70%-130%)	)	
Chrysene	167		160	ug/kg		95.9	(70%-130%)	•	
Dibenzo(a,h)anthracene	167		164	ug/kg		98.3	(70%-130%)	)	
Fluoranthene	167		136	ug/kg		81.6	(70%-130%)	)	•
Fluorene	1670		1340	ug/kg		80.5	(65%-130%)	)	
Indeno(1,2,3-cd)pyrene	167		150	ug/kg		89.9	(70%-130%)	)	
Naphthalene	1670		1230	ug/kg		73.8	(57%-130%)	)	
Phenanthrene	1670		1370	ug/kg		82	(70%-130%)	)	
Pyrene	167		147	ug/kg		88.4	(70%-130%)	}	
*Decafluorobiphenyl	8330		6230	ug/kg		74.8	(23%-104%)	ı	
QC1203034040 MB Acenaphthene		U	4.99	ug/kg					02/13/14 10:22
Acenaphthylene		U	4.99	ug/kg					

**GEL LABORATORIES LLC** 2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

W. I. I. Samer			QC 5	ummai						
Workorder: 342714	Client SDG: XP				ect Descrip			············ <u>···</u> ··············		Page 2 of 4
Parmname	. NOM .	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH Batch 1365968										
Anthracene			U	1.66	ug/kg					
Benzo(a)anthracene			U	0.532	ug/kg				CWW	02/13/14 10:22
Delizo(a)anunacene										
Benzo(a)pyrene			U	0.532	ug/kg					
Benzo(b)fluoranthene			U	0.532	ug/kg					
Benzo(ghi)perylene			U	0.532	ug/kg					•
Benzo(k)fluoranthene			U	0.266	ug/kg					
Delizo(k)Haoranthene					~B/ 1.5					
Chrysene			U	0.532	ug/kg					
Dibenzo(a,h)anthracene			U	0.532	ug/kg					
Fluoranthene			U	0.532	ug/kg					
Fluorene			U	4.99	ug/kg					
Indeno(1,2,3-cd)pyrene			U	0.532	ug/kg					
Naphthalene			U	4.99	ug/kg					
Phenanthrene			U	4.99	ug/kg					
Pyrene			U	0.532	ug/kg					
**Decafluorobiphenyl	8320			5910	ug/kg		71	(23%-104%	<b>)</b>	
QC1203034042 342714002 MS										
Acenaphthene	1950	U 5.8	7	1320	ug/kg		67.4	(49%-90%	o)	02/13/14 13:11
Acenaphthylene	1950	U 5.8	7	1310	ug/kg		67.1	(48%-97%	o)	
Anthracene	1950	U 1.9	6	1500	ug/kg		76.9	(49%-91%	<b>b</b> )	
Benzo(a)anthracene	195	U 0.62	6	139	ug/kg		71.2	(29%-126%	)	
Benzo(a)pyrene		U 0.62		137	ug/kg		70.3	(26%-130%		
Benzo(b)fluoranthene	195	U 0.62	6	136	ug/kg		69.5	(32%-135%	)	
Benzo(ghi)perylene	195	J 0.68	5	133	ug/kg		67.8	(34%-125%	•)	

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## **QC Summary**

			<u>QC 5</u>	ummai	<u>.</u> Y				
Workorder: 342714	Client SDG:	XP004	9	Proj	ect Descrip	tion: RC-	232 Soil		Page 3 of 4
Parmname	NOM		Sample Qual	QC	Units	RPD%	REC%	Range Anist	Date Time
HPLC-PAH Batch 1365968									
Benzo(k)fluoranthene	97.7	U	0.313	63.5	ug/kg		65	(48%-142%) CWW	02/13/14 13:11
Chrysene	195	U	0.626	155	ug/kg		79.1	(39%-127%)	
Dibenzo(a,h)anthracene	195	U	0.626	158	ug/kg		80.8	(38%-130%)	
Fluoranthene	195	J	1.37	133	ug/kg		67.3	(20%-139%)	
Fluorene	1950	U	5.87	1360	ug/kg		69.3	(51%-90%)	
Indeno(1,2,3-cd)pyrene	195	U	0.626	141	ug/kg		72.1	(41%-145%)	
Naphthalene	1950	U	5.87	1270	ug/kg		65.2	(43%-87%)	
Phenanthrene	1950	U	5.87	1380	ug/kg		70.4	(50%-100%)	
Pyrene	195	J	1.72	145	ug/kg		73.6	(18%-149%)	
**Decafluorobiphenyl	9770		5710	6350	ug/kg		65	(23%-104%)	
QC1203034043 342714002 MSE Acenaphthene	1950	U	5.87	1440	ug/kg	9.17	73.9	(0%-30%)	02/13/14 13:53
Acenaphthylene	1950	U	5.87	1440	ug/kg	9.31	73.8	(0%-30%)	
Anthracene	1950	U	1.96	1650	ug/kg	9.55	84.8	(0%-30%)	
Benzo(a)anthracene	195	U	0.626	154	ug/kg	10.1	78.9	(0%-30%)	
Benzo(a)pyrene	195	U	0.626	153	ug/kg	10.9	78.6	(0%-30%)	
Benzo(b)fluoranthene	195	U	0.626	150	ug/kg	9.76	76.8	(0%-30%)	
Benzo(ghi)perylene	195	J	0.685	147	ug/kg	9.67	74.8	(0%-30%)	
Benzo(k)fluoranthene	97.6	U	0.313	70.2	ug/kg	10.0	72	(0%-30%)	
Chrysene	195	U	0.626	170	ug/kg	9.36	87	(0%-30%)	
Dibenzo(a,h)anthracene	195	U	0.626	174	ug/kg	9.78	89.2	(0%-30%)	
Fluoranthene	195	j	1.37	147	ug/kg	10.1	74.7	(0%-30%)	

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#### **QC Summary**

Workorder: 342714	Client SDG: XP004	49	Proj	ect Descrip	tion: RC-	232 Soil			Page 4 of 4
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH Batch 1365968									
Fluorene	1950 U	5.87	1490	ug/kg	9.68	76.5	(0%-30%)	cww	02/13/14 13:53
Indeno(1,2,3-cd)pyrene	195 U	0.626	154	ug/kg	9.17	79.1	(0%-30%)		
Naphthalene	1950 U	5.87	1380	ug/kg	7.88	70.6	(0%-30%)		
Phenanthrene	1950 U	5.87	1510	ug/kg	9.58	77.6	(0%-30%)		
Pyrene	195 J	1.72	161	ug/kg	10.1	81.6	(0%-30%)		
*Decafluorobiphenyl	9760	5710	6880	ug/kg		70.6	(23%-104%)		

#### Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (Organics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

- ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
- * Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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**QC Summary** 

Report Date: February 20, 2014

Page 1 of 3

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21

Richland, Washington

Contact:

Joan Kessner

Contact:	Joan Kessner											
Workorder:	342714	Client SDG: XP0049			Proj	ect Descrip	tion: RC-	232 Soil				
Parmname		NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anl	st	Date	Time
Semi-Volatiles-HER Batch 136	t <b>B</b> 65971		*****	<del></del>	and a secondary to the					-		
QC1203034045 2,4,5-T	LCS	39.9			36.0	ug/kg		90	(52%-137%) RX	ŒI	02/13/1	4 00:58
2,4,5-TP		39.9			33.8	ug/kg		84.5	(58%-133%)			
2,4-D		39.9			33.1	ug/kg		82.9	(53%-139%)			
2,4-DB		39.9			35.7	ug/kg		89.3	(61%-139%)			
Dalapon		399			232	ug/kg		58.2	(39%-113%)			
Dicamba		39.9			28.8	ug/kg		72.1	(54%-118%)			
Dichlorprop		39.9			30.4	ug/kg		76.1	(59%-126%)			
Dinoseb		39.9		P	46.3	ug/kg		116*	(39%-94%)			
МСРА		3990			2930	ug/kg		73.3	(60%-120%)			
МСРР		3990			2170	ug/kg		54.2	(50%-123%)			
**2,4-Dichlorophen	ylacetic acid	99.9			83.4	ug/kg		83.6	(38%-142%)			
QC1203034044 2,4,5-T	МВ			U	1.66	ug/kg					02/13/	14 00:31
2,4,5-TP				U	1.66	ug/kg						
2,4-D				U	1.66	ug/kg						
2,4-DB				U	1.66	ug/kg						
Dalapon				U	35.0	ug/kg						
Dicamba				U	2.00	ug/kg						
Dichlorprop				U	2.26	ug/kg						
Dinoseb				U	1.66	ug/kg						

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**OC Summary** 

Workorder: 342714			<u>VC 51</u>	ımmar						
	Client SDG: XP0049					tion: RC-	232 Soil			Page 2 of 3
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range A	Anist	Date Time
Semi-Volatiles-HERB Batch 1365971										
МСРА			U	230	ug/kg					
МСРР			U	200	ug/kg				RXE1	02/13/14 00:31
**2,4-Dichlorophenylacetic acid	99.9			83.3	ug/kg		83.4	(38%-142%)		
QC1203034046 342714003 MS 2,4,5-T	44.1 DU	18.4	DJ	37.3	ug/kg		84.4	(45%-131%)		02/13/14 02:43
2,4,5-TP	44.I DU	18.4	DJ	38.7	ug/kg		87.6	(49%-135%)		
2,4-D	44.1 DU	18.4	DJ	35.8	ug/kg		81.1	(53%-135%)		
2,4-DB	44.1 DU	18.4	DJ	48.3	ug/kg		110	(61%-139%)		
Dalapon	441 DTU	387	DTU	386	ug/kg		0 *	(30%-113%)		
Dicamba	44.1 DU	22.1	DJ	41.0	ug/kg		92.9	(48%-124%)		
Dichlorprop	44.1 DU	25.0	DJ	39.1	ug/kg		88.5	(46%-138%)		
Dinoseb	44.1 DU	18.4	DJ	39.4	ug/kg		89.2	(25%-130%)		
MCPA	4410 DU	2540	DJ	3680	ug/kg		83.3	(50%-133%)		
МСРР	4410 DU	2210	DJ	3390	ug/kg		76.8	(47%-123%)		
**2,4-Dichlorophenylacetic acid	110	110		117	ug/kg		106	(38%-142%)		
QC1203034047 342714004 MSD 2,4,5-T	41.3 DU	17.2	DJ	41.2	ug/kg	9.99	99.7	(0%-32%)		02/13/14 03:09
2,4,5-TP	41.3 DU	17.2	DJ	40.3	ug/kg	4.05	97.4	(0%-31%)		
2,4-D	41.3 DU	17.2	DJ	38.0	ug/kg	6.06	91.9	(0%-70%)		
2,4-DB	41.3 DU	17.2	D	55.9	ug/kg	14.5	135	(0%-27%)		
Dalapon	413 DTU	363	DU	362	ug/kg	N/A	0*	(0%-18%)		
Dicamba	41.3 DU	20.7	DJ	41.6	ug/kg	1.46	101	(0%-41%)		
Dichlorprop	41.3 DU	23.4	DJ	40.8	ug/kg	4.25	98.7	(0%-40%)		
Dinoseb	41.3 DU	17.2	DJ	40.8	ug/kg	3.46	98.6	(0%-169%)		

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#### **QC Summary**

Workerder: 342714	Client SDG:	XP004	49		Proje	ect Descrip	tion: RC-2	232 Soil			Page 3 of
Parmname	NO	М	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-HERB Batch 1365971											
МСРА	4130	DU	2380	Dì	3910	ug/kg	6.07	94.5	(0%-38%)	RXEI	02/13/14 03:0
МСРР	4130	DU	2070	DJ	3810	ug/kg	11.5	92.1	(0%-30%)		
*2,4-Dichlorophenylacetic ac	id 103		108		117	ug/kg		113	(38%-142%)		

#### Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

[^] The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

^{*} Indicates that a Quality Control parameter was not within specifications.

Date:

14 April 2014

To:

Washington Closure Hanford Inc. (technical representative)

From:

**ELR Consulting** 

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil Full Protocol - Waste Site

600-382

Subject:

Pesticide/PCB - Data Package No. XP0049-GEL

#### INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0049 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1T973	2/4/14	Soil	С	See note 1
J1T974	2/4/14	Soil	С	See note 1
J1T975	2/4/14	Soil	С	See note 1
J1T976	2/4/14	Soil	С	See note 1
J1T977	2/4/14	Soil	С	See note 1
J1T978	2/4/14	Soil	С	See note 1

^{1 -} Pesticides by 8081B & PCBs by 8082A.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Data Requested by Client

#### DATA QUALITY OBJECTIVES

## **Holding Times**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Analytes must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction. Holding times are not applicable for PCB analysis.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

#### Method Blanks

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

## Field (equipment) Blanks

No field blanks were submitted for analysis.

#### Accuracy

## Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

Due to the lack of a matrix spike, matrix spike duplicate and LCS analysis, all toxaphene results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

#### Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

#### Precision

## Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

Due to the lack of a matrix spike and matrix spike duplicate analysis, all toxaphene results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

#### Field Duplicate Samples

One set field duplicates (J1T973/J1T978) were submitted for analysis. Laboratory duplicates are compared using the same criteria as for laboratory results. All field duplicate results are acceptable.

#### Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. Six pesticide analytes exceeded the RQL. Under the WCH statement of work, no qualification is required. All other analytes met the RQL.

#### Completeness

Data package No. XP0049 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

#### **MAJOR DEFICIENCIES**

None found.

#### MINOR DEFICIENCIES

The following minor deficiencies were noted:

 Due to the lack of a matrix spike, matrix spike duplicate and LCS analysis, all toxaphene results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

#### REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

# Appendix 1 Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The
  data may not be valid for some specific applications (i.e., usable for decisionmaking purposes).
- N Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

# Appendix 2 Summary of Data Qualification

## PESTICIDE/PCB DATA QUALIFICATION SUMMARY*

SDG: XP0049	REVIEWER: ELR	Project: 600-382	PAGE_1_OF_1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Toxaphene	J	All	No MS, MSD or LCS analysis

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

# Appendix 3 Annotated Laboratory Reports

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 13, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

RC-232 Soil

Sample ID:

Client Sample ID: J1T973

Matrix:

342714001 SOIL

Collect Date:

04-FEB-14 08:20

Receive Date:

07-FEB-14 Client

Collector: Moisture:

1.85%

Client SDG: XP0049

Project: Client ID: WCHN00213

WCHN001

1 4/131	V	4/13/1	\
---------	---	--------	---

Parameter	Qualifier	Result	DL	RL	Unit	ts DF	Analyst Da	te Time Batch	Metho
Semi-Volatiles-PCB							· · · · · · · · · · · · · · · · · · ·		
SW846 3541/8082A F	PCB Solid Auto	omated Soxhlet "Dr	y Weight Correc	eted"					
Aroclor-1016	DU	22.6	22.6	67.9	ug/ks	20	JXM 02/13/1	4 0751 1366122	1
Aroclor-1221	DU	22.6	22.6	67.9					
Aroclor-1232	DU	22.6	22.6	67.9		•			
Aroclor-1242	DU	22.6	22.6	67.9		-			
Aroclor-1248	DU	22.6	22.6	67.9		•			
Aroclor-1254	DU	22.6	22.6	67.9		•			
Aroclor-1260	DU	22.6	22.6	67.9		,			
The following Prep M	fethods were pe	erformed:							
Method	Description	n		Analyst	Date	Tim	e Prep Bar	tch	
SW846 3541	Prep Method	3541 PCB Prep Soil		SJW1	02/12/1	4 0955	<del></del>		
The following Analyt	tical Methods v	vere performed:							
Method	Description		· · · · · · · · · · · · · · · · · · ·			Analyst Co	mments		
1	SW846 3541/	8082A							
Surrogate/Tracer Reco	overy Test				Result	Nominal	Recovery%	Acceptable I	Limits
4cmx		3541/8082A PCB Solid eight Corrected"	Automated Soxhlet		5.04 ug/kg	6.79	74.2	(44%-106%	6)
Decachlorobiphenyl	SW846	3541/8082A PCB Solid eight Corrected"	Automated Soxhlet		2.85 ug/kg	6.79	41.9	(35%-119%	<b>6</b> )

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 13, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Sample ID:

Client Sample ID: J1T974

342714002

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:50

Receive Date: Collector: 07-FEB-14 Client

Moisture:

14.8%

V 4/13/14

Parameter	Qualifier	Result	DL	RL	Uni	ts DF	Analyst D	ate Tir	ne Batch	Method
Semi-Volatiles-PCB										
SW846 3541/8082A PC	B Solid Auto	omated Soxhlet "Dry	Weight Correc	cted"						
Aroclor-1016	DU	26.0	26.0	78.1	ug/kį	3 20	JXM 02/1	3/14 0805	1366122	l
Aroclor-1221	DU	26.0	26.0	78.1	ug/kį	g 20				
Aroclor-1232	DU	26.0	26.0	78.1	ug/kį	g 20				
Aroclor-1242	DU	26.0	26.0	78.1	ug/kį	g 20				
Aroclor-1248	DU	26.0	26.0	78.1	ug/kį	g 20				
Aroclor-1254	DU	26.0	26.0	78.1	ug/kį	g 20				
Aroclor-1260	DU	26.0	26.0	78.1	ug/k	3 20				
The following Prep Me	thods were pe	erformed:								
Method	Description	n		Analyst	Date	Tim	ie Prep I	Batch		
SW846 3541	Prep Method	3541 PCB Prep Soil		SJW1	02/12/1	4 0955	136612	0		
The following Analytic	cal Methods v	were performed:								
Method	Description					Analyst Co	mments			
I	SW846 3541/	8082A								
Surrogate/Tracer Recov	very Test				Result	Nominal	Recovery	% Acc	ceptable l	imits
4cmx		3541/8082A PCB Solid A /eight Corrected"	utomated Soxhler	t	6.38 ug/kg	7.81	81.7		(44%-106%	6)
Decachlorobiphenyl	SW846	i 3541/8082A PCB Solid A /eight Corrected"	utomated Soxhle	t	7.63 ug/kg	7.81	97.6		(35%-119%	<b>(6)</b>

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## **Certificate of Analysis**

Report Date: February 13, 2014

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project: Client Sample ID: J1T975

RC-232 Soil

Project: Client ID:

WCHN00213 WCHN001

Sample ID:

342714003

SOIL

Matrix: Collect Date:

04-FEB-14 09:20

Receive Date:

07-FEB-14 Client

Collector:

Moisture:

9.67%

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst Date	Time Batch	Metho
Semi-Volatiles-PC	В		The state of the s						
SW846 3541/8082	A PCB Solid Auto	mated Soxhlet "Dry	Weight Correc	ted"					
Aroclor-1016	DU	24.5	24.5	73.7	ug/kg	20	JXM 02/13/14	0819 1366122	1
Aroclor-1221	DU	24.5	24.5	73.7	ug/kg	20			
Aroclor-1232	DU	24.5	24.5	73.7	ug/kg	20			
Aroclor-1242	DU	24.5	24.5	73.7	ug/kg	20			
Aroclor-1248	DU	24.5	24.5	73.7	ug/kg	- 20			
Aroclor-1254	DU	24.5	24.5	73.7	ug/kg	20			
Aroclor-1260	DU	24.5	24.5	73.7	ug/kg	20			
The following Prep	Methods were pe	erformed:							
Method	Description	1		Analyst	Date	Tim	e Prep Batc	h	
SW846 3541	Prep Method	3541 PCB Prep Soil	\$	SJW I	02/12/1	4 0955	1366120		
The following Ana	alytical Methods v	vere performed:							
Method	Description					Analyst Co	mments		
1	SW846 3541/	8082A							
Surrogate/Tracer R	ecovery Test				Result	Nominal	Recovery%	Acceptable L	imits
4cmx		3541/8082A PCB Solid A	utomated Soxhlet		6.33 ug/kg	7.37	85.9	(44%-106%	ó)
Decachlorobiphenyl		eight Corrected" 3541/8082A PCB Solid A	utomated Soxblet		7.84 ug/kg	7.37	106	(35%-119%	<b>6</b> )

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## **Certificate of Analysis**

Report Date: February 13, 2014

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

**Analyst Comments** 

Client Sample ID: J1T976

Project:

WCHN00213

Sample ID: Matrix:

342714004

SOIL

Client ID:

WCHN001

Collect Date:

04-FEB-14 09:40

Receive Date:

07-FEB-14

Collector: Moisture:

Client 3.47%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Tin	e Batch	Method
Semi-Volatiles-PC	СВ						· · · · · · · · · · · · · · · · · · ·				
SW846 3541/8082	2A PCB Solid Auto	omated Soxhlet "Dry V	Veight Correc	cted"							
Aroclor-1016	DU	23.0	23.0	69.0	ug/kg	20	JXM 0	2/13/14	0834	1366122	1
Aroclor-1221	DU	23.0	23.0	69.0	ug/kg	20					
Aroclor-1232	DU	23.0	23.0	69.0	ug/kg	20					
Aroclor-1242	DU	23.0	23.0	69.0	ug/kg	20					
Aroclor-1248	DU	23.0	23.0	69.0	ug/kg	20					
Aroclor-1254	DU	23.0	23.0	69.0	ug/kg	20					
Aroclor-1260	DU	23.0	23.0	69.0	ug/kg	20					
The following Pre	p Methods were pe	erformed:									
Method	Description	1		Analyst	Date	Tim	e Pre	p Batcl	1	<del> </del>	
SW846 3541	Prep Method	3541 PCB Prep Soil		SJW1	02/12/14	0955	1360	5120			

Description

ı sw	846 3541/8082A				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.75 ug/kg	6.90	83.3	(44%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	7.43 ug/kg	6.90	108	(35%-119%)

Notes:

Method

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## Certificate of Analysis

Report Date: February 13, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Sample ID:

Client Sample ID: J1T977

Client ID:

WCHN001

Matrix:

342714005

SOIL 04-FEB-14 10:00

Collect Date: Receive Date:

07-FEB-14

Collector:

Client

Moisture:

2.76%

	2.70	.,•			٧,				
Parameter	Qualifier	Result	DL	RL	Uni	ts DF	Analyst Date	Time Batch	Metho
Semi-Volatiles-PCB									
SW846 3541/8082A	PCB Solid Auto	omated Soxhlet "Dr	y Weight Correc	eted"					
Aroclor-1016	DU	22.8	22.8	68.4	ug/k	g 20	JXM 02/13/14	0848 1366122	1
Aroclor-1221	DU	22.8	22.8	68.4	ug/k	g 20			
Aroclor-1232	DU	22.8	22.8	68.4	ug/k	g 20			
Aroclor-1242	DU	22.8	22.8	68.4	ug/k	g 20			
Aroclor-1248	DU	22.8	22.8	68.4	l ug∕k _i	g 20			
Aroclor-1254	DU	22.8	22.8	68.4	ug/k	g 20			
Aroclor-1260	DU	22.8	22.8	68.4	ug/k	g 20			
The following Prep	Methods were pe	erformed:							
Method	Description	n		Analyst	Date	Tim	ne Prep Bat	ch	
SW846 3541	Prep Method	3541 PCB Prep Soil		SJW I	02/12/1	4 0955	1366120		
The following Anal	lytical Methods v	were performed:							
Method	Description	l	the sale of the sa			Analyst Co	mments	100	
I	SW846 3541/	8082A							
Surrogate/Tracer Re	ecovery Test				Result	Nominal	Recovery%	Acceptable l	Limits
4cmx		3541/8082A PCB Solid eight Corrected"	Automated Soxhlet		5.85 ug/kg	6.84	85.6	(44%-106%	6)
Decachlorobiphenyl	SW846	3541/8082A PCB Solid eight Corrected"	Automated Soxhlet		7.60 ug/kg	6.84	111	(35%-1199	6)

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## **Certificate of Analysis**

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Joan Kessner

Project: RC-232 Soil

Company:

Address:

Client Sample ID: J1T978
Sample ID: 342714006
Matrix: SOIL

Collect Date: 04-FEB-14 08:20
Receive Date: 07-FEB-14
Collector: Client

Moisture: 1.72%

Client SDG: XP0049

Project: Client ID: WCHN00213 WCHN001

Report Date: February 13, 2014

V 4/13/14

Parameter	Qualifier	Result	DL	RL	Units	DF An	alyst Date	Time Batch	Method
Semi-Volatiles-Po	СВ								•
SW846 3541/808	2A PCB Solid Auto	omated Soxhlet "Dr	y Weight Correc	cted"					
Aroclor-1016	DU	22.5	22.5	67.7	ug/kg	20 JX	M 02/13/14	1010 1366122	1
Aroclor-1221	DU	22.5	22.5	67.7	ug/kg	20			
Aroclor-1232	DU	22.5	22.5	67.7	ug/kg	20			
Aroclor-1242	DU	22.5	22.5	67.7	ug/kg	20			
Aroclor-1248	DU	22.5	22.5	67.7	ug/kg	20			
Aroclor-1254	DU	22.5	22.5	67.7	ug/kg	20			
Aroclor-1260	DU	22.5	22.5	67.7	ug∕kg	20			
The following Pro	ep Methods were p	erformed:							
Method	Descriptio			Analyst	Date	Time	Prep Batcl	า	
SW846 3541	Prep Method	3541 PCB Prep Soil		SJW1	02/12/14	0955	1366120		
The following A	nalytical Methods	were performed:							
Method	Description	1			An	alyst Comn	nents		

1 SW	846 3541/8082A				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet	6.12 ug/kg	6.77	90.4	(44%-106%)
Decachlorobiphenyl	"Dry Weight Corrected" SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.27 ug/kg	6.77	77.9	(35%-119%)

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## **Certificate of Analysis**

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

RC-232 Soil

Client Sample ID: J1T973

Sample ID: Matrix:

342714001 SOIL

Collect Date:

04-FEB-14 08:20

Receive Date: Collector:

07-FEB-14

Client Moisture: 1.85% Client SDG: XP0049

Project: Client ID: WCHN00213 WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF A	nalyst Date	Time Batch	Method
Semi-Volatiles-Pesticio	de								
8081B/3541 Pesticide	Soil Automate	d Soxhlet "Dry Weight	Corrected"						
4,4'-DDD	DU	3.39	3.39	13.6	ug/kg	10 R	XE1 02/12/14	2112 1365859	1
4,4'-DDE	DU	3.39	3.39	13.6	ug/kg	10			
4,4'-DDT	DU	3.39	3.39	13.6	ug/kg	10			
Aldrin	DU	1.70	1.70	6.79	ug/kg	10			
Dieldrin	DU	3.39	3.39	13.6	ug/kg	10			
Endosulfan I	DU	1.70	1.70	6.79	ug/kg	10			
Endosulfan II	DU	3.39	3.39	13.6	ug/kg	10			
Endosulfan sulfate	DU	3.39	3.39	13.6	ug/kg	10			
Endrin	DU	3.39	3.39	13.6	.ug/kg	10			
Endrin aldehyde	DU	3.39	3.39	13.6	ug/kg	10			
Endrin ketone	DU	3.39	3.39	13.6	ug/kg	10			
Heptachlor	DU	1.70	1.70	6.79	ug/kg	10			
Heptachlor epoxide	DU	1.70	1.70	6.79	ug/kg	10			
Methoxychlor	DU	17.0	17.0	67.9	ug/kg	10			
Toxaphene	DU 🗥	56.5	56.5	170	ug/kg	10			
alpha-BHC	DU T	1.70	1.70	6.79	ug/kg	10			
alpha-Chlordane	DU	1.70	1.70	6.79	ug/kg	10			
beta-BHC	DU	1.70	1.70	6.79	ug/kg	10			
delta-BHC	DU	1.70	1.70	6.79	ug/kg	10			
gamma-BHC (Lindane)	DU	1.70	1.70	6.79	ug/kg	10			
gamma-Chlordane	DU	1.70	1.70	6.79	ug/kg	10			
The following Prep M	ethods were pe	erformed:							
Method	Description	n		Analyst	Date	Time	Prep Batch	1	
SW846 3541	Prep Method	3541 8081B Prep Soil	(	CXR2	02/11/14	1035	1365857		

The following Analytical Methods were performed:

Method	Description	Analyst Comments						
1	SW846 3541/8081B							
Surrogate/Tracer Recove	y Test	Result	Nominal	Recovery%	Acceptable Limits			
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	39.8 ug/kg	33.9	117	(32%-120%)			
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	38.5 ug/kg	33.9	114	(37%-129%)			

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## Certificate of Analysis

Report Date: February 14, 2014

Client SDG: XP0049

10

10

**Analyst Comments** 

Project:

Client ID:

WCHN00213

WCHN001

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

RC-232 Soil

Client Sample ID: J1T974

Sample ID:

342714002

Matrix:

SOIL

Collect Date: Receive Date: 04-FEB-14 08:50 07-FEB-14

Collector:

Client

Moisture:

14.8%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analys	t Date	Tim	e Batch	Method
Semi-Volatiles-Pesti	cide										
8081B/3541 Pesticid	le Soil Automate	ed Soxhlet "Dry We	eight Corrected"								
4,4'-DDD	DU	3.91	3.91	15.6	ug/kg	10	RXE1	02/12/14	2157	1365859	1
4,4'-DDE	DU	3.91	3.91	15.6	ug/kg	10					
4,4'-DDT	DU	3.91	3.91	15.6	ug/kg	10					
Aldrin	DU	1.95	1.95	7.82	ug/kg	10					
Dieldrin	DU	3.91	3.91	15.6	ug/kg	10					
Endosulfan I	DU	1.95	1.95	7.82	ug/kg	10					
Endosulfan II	DU	3.91	3.91	15.6	ug/kg	10					
Endosulfan sulfate	DU	3.91	3.91	15.6	ug/kg	10					
Endrin	DU	3.91	3.91	15.6	ug/kg	10					
Endrin aldehyde	DU	3.91	3.91	15.6	ug/kg	10					
Endrin ketone	DU	3.91	3.91	15.6	ug/kg	10					
Heptachlor	DU	1.95	1.95	7.82	ug/kg	10					
Heptachlor epoxide	DU	1.95	1.95	7.82	ug/kg	10					
Methoxychlor	DU	19.5	19.5	78.2	ug/kg	10					
Toxaphene	DU	<b>J</b> 65.1	65.1	195	ug/kg	. 10					
alpha-BHC	DU .	1.95	1.95	7.82	ug/kg	10					
alpha-Chlordane	DU	1.95	1.95	7.82	ug/kg	10					
beta-BHC	DU	1.95	1.95	7.82	ug/kg	10					
delta-BHC	DII	1.95	1.95	7.82	ug/kg	10					

The following Prep Methods were performed:									
Method	Description	Analyst	Date	Time	Prep Batch				
SW846 3541	Prep Method 3541 8081B Prep Soil	CXR2	02/11/14	1035	1365857				

1.95

1.95

The following Analytical Methods were performed:

DU

DU

Description

Weight Corrected"

1.95

1.95

1 SW	346 3541/8081B				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	39,4 ug/kg	39.1	101	(32%-120%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry	53.0 ug/kg	39.1	136*	(37%-129%)

7.82

ug/kg

ug/kg

Notes:

Method

gamma-BHC (Lindane)

gamma-Chlordane

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Sample ID:

Client Sample ID: J1T975

342714003

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 09:20

Receive Date:

07-FEB-14

Collector: Moisture:

Client 9.67%

Parameter	Qualifier	Result	DL	RL	Units	s DF	Analyst D	ate	Time Batch	Method
Semi-Volatiles-Pesticio	le									
8081B/3541 Pesticide S	Soil Automate	d Soxhlet "Dry Wei	ght Corrected"							
4,4'-DDD	DU	3.68	3.68	14.7	ug/kg	10	RXE1 02/12	2/14 2	212 1365859	1
4,4'-DDE	DU	3.68	3.68	14.7	ug/kg	10				
4,4'-DDT	DU	3.68	3.68	14.7	ug/kg	10				
Aldrin	DU	1.84	1.84	7.37	ug/kg	10				
Dieldrin	DU	3.68	3.68	14.7	ug/kg	10				
Endosulfan I	DU	1.84	1.84	7.37	ug/kg					
Endosulfan II	DU	3.68	3.68	14.7	ug/kg	10				
Endosulfan sulfate	DU	3.68	3.68	14.7	ug/kg					
Endrin	DU	3.68	3.68	14.7	ug/kg					
Endrin aldehyde	ĐU	3.68	3.68	14.7	ug/kg					
Endrin ketone	DU	3.68	3.68	14.7	ug/kg					
Heptachlor	DU	1.84	1.84	7.37	ug/kg					
Heptachlor epoxide	DU	1.84	1.84	7.37	ug/kg	. 10				
Methoxychlor	DU _	18.4	18.4	73.7	ug/kg					
Toxaphene	DU T	61.3	61.3	i 84	ug/kg					
alpha-BHC	DU	1.84	1.84	7.37	ug/kg					
alpha-Chlordane	DU	1.84	1.84	7.37	ug/kg	10				
beta-BHC	DU	1.84	1.84	7.37	ug/kg					
delta-BHC	DU	1.84	1.84	7.37	ug/kg	10				
gamma-BHC (Lindane)	DU	1.84	1.84	7.37	ug/kg					
gamma-Chlordane	DU	1.84	1.84	7.37	ug/kg	10				
The following Prep Me	thods were pe	erformed:								
Method	Description	1		Analyst	Date	Tim	e Prep B	Batch		
SW846 3541	Prep Method	3541 8081B Prep Soil		CXR2	02/11/14	1035	1365857	7		
The following Analyti	cal Methods v	vere performed:								
Method	Description					Analyst Co	mments			
1	SW846 3541/8									
Surrogate/Tracer Reco	very Test				Result	Nominal	Recovery	% A	Acceptable L	imits
4cmx		3541 Pesticide Soil Autor Corrected"	nated Soxhlet "Dry	3	6.0 ug/kg	36.8	97.7		(32%-120%	))
Decachlorobiphenyl	8081B/3	Corrected 3541 Pesticide Soil Autor Corrected"	nated Soxhlet "Dry	4	4.5 ug/kg	36.8	121		(37%-129%	)

Notes:

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

WCHN00213

WCHN001

Project:

Client ID:

Project:

RC-232 Soil

Sample ID:

Client Sample ID: J1T976

342714004 SOIL

Matrix: Collect Date:

04-FEB-14 09:40

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

3.47%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analysi	Date	Time Batch	Method
Semi-Volatiles-Pestici	de								····	
8081B/3541 Pesticide	Soil Automate	d Soxhlet "Dry Weigh	t Corrected"							
4,4'-DDD	DU	3.45	3.45	13.8	ug/kg	10	RXE1 (	2/12/14	2227 1365859	1
4,4'-DDE	DU	3.45	3.45	13.8	ug/kg	10		,,		•
4,4'-DDT	DU	3.45	3.45	13.8	ug/kg	10				
Aldrin	DU	1,72	1.72	6.90	ug/kg	10				
Dieldrin	DU	3.45	3.45	13.8	ug/kg	10				
Endosulfan I	DU	1.72	1.72	6.90	ug/kg	10				
Endosulfan II	DU	3.45	3.45	13.8	ug/kg	10				
Endosulfan sulfate	DU	3.45	3.45	13.8	ug/kg	10				
Endrin	DU	3.45	3.45	13.8	ug/kg	10				
Endrin aldehyde	DU	3.45	3.45	13.8	ug/kg	10		,		
Endrin ketone	DU	3.45	3.45	13.8	ug/kg	10				
Heptachlor	DU	1.72	1.72	6.90	ug/kg	10				
Heptachlor epoxide	DU	1.72	1.72	6.90	ug/kg	10				
Methoxychior	DU	17.2	17.2	69.0	ug/kg	10				
Toxaphene	Du 🅽	57.4	57.4	172	ug/kg	10				
alpha-BHC	DU T	1.72	1.72	6.90	ug/kg	10				
alpha-Chlordane	DU	1.72	1.72	6.90	ug/kg	10				
beta-BHC	DU	1.72	1.72	6.90	ug/kg	10				
delta-BHC	DU	1.72	1.72	6.90	ug/kg	10				
gamma-BHC (Lindane)	DU	1.72	1.72	6.90	ug/kg	10				
gamma-Chlordane	DU	1.72	1.72	6.90	ug/kg	10				
The following Prep M	ethods were pe	erformed:								
Method	Description		F	Analyst	Date	Time	Pre	p Batch		
SW846 3541	Prep Method	3541 8081B Prep Soil		XR2	02/11/14	1035		5857		

The following Analytical Methods were performed:

Method De	scription	Analyst Comments						
I SW	846 3541/8081B							
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits			
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	26.3 ug/kg	34.5	76.3	(32%-120%)			
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	31.2 ug/kg	34.5	90.4	(37%-129%)			

**GEL LABORATORIES LLC** 2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 14, 2014

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

Client SDG: XP0049

RC-232 Soil

Project: Client ID:

WCHN00213 WCHN001

Sample ID:

Client Sample ID: J1T977

342714005

Matrix:

SOIL

Collect Date:

04-FEB-14 10:00

Receive Date: Collector:

07-FEB-14 Client

Moisture:

2.76%

V	4/0	14
V	4/6	)

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst Date	Time Batch Method
Semi-Volatiles-Pesticid	le							
8081B/3541 Pesticide S	Soil Automated	d Soxhlet "Dry Wei	ight Corrected"					
4,4'-DDD	DU	3.42	3.42	13.7	ug/kg	10	RXE1 02/12/14	2242 1365859 1
4,4'-DDE	DU	3.42	3.42	13.7	ug/kg	10		
4,4'-DDT	DU	3.42	3.42	13.7	ug/kg	10		
Aldrin	DU	1.71	1.71	6.84	ug/kg	10		
Dieldrin	DU	3.42	3.42	13.7	ug/kg	10		
Endosulfan I	DU	1.71	1.71	6.84	ug/kg			
Endosulfan II	DU	3.42	3.42	13.7	ug/kg	; 10		
Endosulfan sulfate	DU	3.42	3.42	13.7	ug/kg	10		
Endrin	DU	3.42	3.42	13.7	ug/kg			*
Endrin aldehyde	DU	3,42	3.42	13.7	ug/kg			
Endrin ketone	DU	3.42	3.42	13.7	ug/kg		,	
Heptachlor	DU	1.71	1.71	6.84	ug/kg			
Heptachlor epoxide	DU	1.71	1.71	6.84	ug/kg			
Methoxychlor	DU _	_ 17.1	17.1	68.4	ug/kg			
Toxaphene	DU J		57.0	171	ug/kg			
alpha-BHC	DU	1.71	1.71	6.84	ug/kg			
alpha-Chlordane	DU	1.71	1.71	6.84	ug/kg			
beta-BHC	DU	1.71	1.71	6.84	ug/kg			
delta-BHC	DU	1.71	1.71	6.84	ug/kg			
gamma-BHC (Lindane)	DU	1.71	1.71	6.84	ug∕kg			
gamma-Chlordane	DU	1.71	1.71	6.84	ug/kg	; 10		
The following Prep Me	thods were pe	rformed:						
Method	Description		A	Analyst	Date '	Tin	e Prep Batc	h
SW846 3541	Prep Method 3	3541 8081B Prep Soil	C	XR2	02/11/1	4 1035	1365857	
The following Analyti	cal Methods w	ere performed:						
Method	Description	, , , , , , , , , , , , , , , , , , ,				Analyst Co	mments	
1	SW846 3541/8	081B						
Surrogate/Tracer Recor	very Test				Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3	541 Pesticide Soil Auto	mated Soxhlet "Dry		31.8 ug/kg	34.2	93.0	(32%-120%)
Decachlorobiphenyl		Corrected" 541 Pesticide Soil Auto	mated Southlet *Dry		37.2 ug/kg	34.2	109	(37%-129%)
Decacinoroorphenyi		Corrected"	mated Somittee Dry	•	JI.Z UE/KE	34.4	109	(3/70-12770)

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## Certificate of Analysis

Report Date: February 14, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner RC-232 Soil

Project: Client Sample ID: J1T978

Sample ID:

342714006

Matrix:

SOIL

Collect Date: Receive Date: 04-FEB-14 08:20

Collector:

07-FEB-14 Client

Moisture:

1.72%

Client SDG: XP0049

Project:

Client ID:

WCHN00213

WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF A	nalyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticio	de										
8081B/3541 Pesticide	Soil Automate	d Soxhlet "Dry Weigh	t Corrected"								
4.4'-DDD	DU	3.39	3.39	13.5	ug/kg	10 F	RXEI 02.	/12/14	2257 1	365859	1
4,4'-DDE	DU	3.39	3.39	13.5	ug/kg	10					
4,4'-DDT	ĐU	3.39	3.39	13.5	ug∕kg	10					
Aldrin	DU	1.69	1.69	6.77	ug/kg	10					
Dieldrin	DU	3.39	3.39	13.5	ug/kg	10					
Endosulfan I	DU	1.69	1.69	6.77	ug/kg	10					
Endosulfan II	DU	3.39	3.39	13.5	ug/kg	10					
Endosulfan sulfate	DU	3.39	3.39	13.5	ug/kg	10					
Endrin	DU	3.39	3.39	13.5	ug/kg	10	•				
Endrin aldehyde	DU	3.39	3.39	13.5	ug/kg	10					
Endrin ketone	DU	3.39	3.39	13.5	ug/kg	10					
Heptachlor	DU	1.69	1.69	6.77	ug/kg	10					
Heptachlor epoxide	DU	1.69	1.69	6.77	ug/kg	10					
Methoxychlor	DU	16.9	16.9	67.7	ug/kg	10					
Toxaphene	DU ,	56.4	56.4	169	ug/kg	10					
alpha-BHC	DU	1.69	1.69	6.77	ug/kg	10					
alpha-Chlordane	DU	1.69	1.69	6.77	ug/kg	10					
beta-BHC	DU	1.69	1.69	6.77	ug/kg	10					
delta-BHC	DU	1.69	1.69	6.77	ug/kg	10					
gamma-BHC (Lindane)	DU	1.69	1.69	6.77	ug/kg	10					
gamma-Chlordane	DU	1.69	1.69	6.77	ug/kg	10					
The following Prep M	ethods were p	erformed:									
Method	Descriptio	n		Analyst	Date	Time		Batcl	1		
SW846 3541	Prep Method	3541 8081B Prep Soil	1	CXR2	02/11/14	1035	1365	857			
The following Analyt	ical Methods	were performed:						····			

3 W 040 3341	1 tep Mediod 3341 doors 1 tep oon
ort C 11 '	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Method	Description	Analyst Comments							
	SW846 3541/8081B								
Surrogate/Tracer Recover	y Test	Result	Nominal	Recovery%	Acceptable Limits				
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry	50.5 ug/kg	33.9	149*	(32%-120%)				
Decachlorobiphenyl	Weight Corrected" 8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	40.5 ug/kg	33.9	119	(37%-129%)				

## Appendix 4

**Laboratory Narrative and Chain-of-Custody Documentation** 

#### **PCB** Case Narrative WC-HANFORD, INC. (WCHN) **SDG XP0049**

#### Method/Analysis Information

Procedure:

Analysis of Polychlorinated Biphenyls by ECD

Analytical Method:

SW846 3541/8082A

Prep Method:

SW846 3541

Analytical Batch Number:

1366122

Prep Batch Number:

1366120

#### Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 3541/8082A:

Sample ID	Client ID
342714001	J1T973
342714002	J1T974
342714003	J1T975
342714004	J1T976
342714005	J1T977
342714006	J1T978
1203034433	Method Blank (MB)
1203034434	Laboratory Control Sample (LCS)
1203034437	342714005(J1T977) Matrix Spike (MS)
1203034438	342714005(J1T977) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

## Preparation/Analytical Method Verification

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-040 REV# 20.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

## **Calibration Information**

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

#### Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

## Continuing Calibration Verification (CCV) Requirements

The associated calibration verification standards (ICV or CCV) did not meet the acceptance criteria.

One of the CCV standards bracketing the samples in this SDG failed to meet the acceptance criteria with positive bias. However, this non-compliance had no adverse effects on the data as the Aroclors were not detected in the associated WCHN samples.

All analytes were within the established retention time windows for this method.

### **Quality Control (QC) Information**

## Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

#### Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for the samples in this SDG in this batch.

#### Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

### QC Sample Designation

Sample 342714005 (J1T977) was selected for the matrix spike and matrix spike duplicate analysis.

## Matrix Spike (MS) Recovery Statement

The MS recoveries for this SDG were within the established acceptance limits.

## Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were within the established acceptance limits.

#### MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD met the acceptance limits.

## **Technical Information**

## **Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

## Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported analyte concentrations were confirmed on dissimilar columns. All sample extracts were cleaned using alumina. Additionally, copper was added to all sample extracts to remove sulfur.

## Sample Dilutions

Samples 1203034437 (J1T977MS), 1203034438 (J1T977MSD), 342714001 (J1T973), 342714002 (J1T974), 342714003 (J1T975), 342714004 (J1T976), 342714005 (J1T977) and 342714006 (J1T978) were diluted prior to analysis due to the oily matrix of the extracts.

## Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG in this batch.

## Miscellaneous Information

## **Electronic Package Comment**

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

## Data Exception (DER) Documentation

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for the samples in this SDG in this batch.

## **Manual Integrations**

Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this PCB fraction.

### **Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

The higher results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS and MSD are from the same analytical column as the parent sample.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate acceptance limits.

Due to rounding differences in the calculation between the forms, the data reported in Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form

Aroclors quantitated on the raw data report by ChemStation data system do not necessarily represent positive Aroclor identification. In order for positive identification to be made, the Aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the Aroclor is reported as a non-detect on the data report.

## **System Configuration**

The Semi-Volatiles-PCB analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD8A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide I)

Agilent 6890 Gas
ECD8A.I_2 Chromatograph/Dual ECD w/
7683 Autosampler

HP6890 Series ECD Rtx-CLP II 30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

## **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

## Pesticide Case Narrative WC-HANFORD, INC. (WCHN) SDG XP0049

### Method/Analysis Information

Procedure: Organochlorine Pesticides and Chlorinated Hydrocarbons

Analytical Method: SW846 3541/8081B

Prep Method: SW846 3541

Analytical Batch Number: 1365859

Prep Batch Number: 1365857

## Sample Analysis

Sample ID	Client ID
342714001	J1T973
342714002	J1T974
342714003	J1T975
342714004	J1T976
342714005	J1T977
342714006	J1T978
1203033720	Method Blank (MB)
1203033721	Laboratory Control Sample (LCS)
1203033722	342714001(J1T973) Matrix Spike (MS)
1203033723	342714001(J1T973) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

## Preparation/Analytical Method Verification

## **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-041 REV# 13.

Raw data reports are processed and reviewed by the analyst using ChemStation software. False positives have been removed from the ChemStation quantitation reports per standard operating procedures (SOP).

## **Calibration Information**

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

#### **Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

## Continuing Calibration Verification (CCV) Requirements

All calibration verification standards (CVS, ICV, or CCV) requirements have not been met for this SDG. The bracketing standard failed with a negative or positive bias for one or more target analytes. All samples were re-analyzed. The bracketing standard failed in the same manner; therefore, the standard failure is attributed to matrix interference. The initial bracket is reported. One or more of five peaks failed with a negative or positive bias in the multi-component standard braketing the samples in this SDG; however, the average amount of the five peaks met the acceptance criteria.

## **Quality Control (QC) Information**

### Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

#### Surrogate Recoveries

Surrogates recovered high on one column only in samples 342714002 (J1T974) and 342714006 (J1T978) due to the dilution necessary to analyze the sample. The data were reported.

### Laboratory Control Sample (LCS) Recovery

The laboratory control sample (LCS) spike recoveries met the acceptance limits.

#### QC Sample Designation

Sample 342714001 (J1T973) was selected for the matrix spike and matrix spike duplicate analysis.

### Matrix Spike (MS) Recovery Statement

The MS recoveries for this SDG were within the established acceptance limits.

## Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were within the established acceptance limits.

#### MS/MSD Relative Percent Difference (RPD) Statement

The RPD values between the MS and MSD were within the acceptance limits.

#### **Technical Information:**

## **Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG in this analytical batch met the specified holding time.

#### Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows.

### Sample Dilutions

Samples 342714001 (J1T973), 342714002 (J1T974), 342714003 (J1T975), 342714004 (J1T976), 342714005 (J1T977) and 342714006 (J1T978) were diluted due to the large amount of sediment in the bottom of the extract vial, the yellow color of the sample extracts, and the high concentration of non-target analytes observed in the screening results.

## Sample Re-extraction/Re-analysis

Samples were re-analyzed due to bracketing check failure. Check failure confirmed. The re-analysis is reported.

#### Florisil

Florisil clean-up was not performed on client and quality control samples in this batch.

## Miscellaneous Information:

#### **Electronic Package Comment**

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

### Data Exception (DER) Documentation

The following DER was generated for this SDG: 1267421

## **Manual Integrations**

Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this pesticide fraction.

#### **Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

Detected target analytes were reported from the analytical column with the higher concentration. Results below the method detection limit (non-detects) were reported from column one.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate recovery acceptance limits.

Due to rounding differences in the calculation between the forms, the data reported in Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

## **System Configuration**

The Semi-Volatiles-Pesticide analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD5A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide)
ECD5A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

## **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DER Report No.: 1267421

Revision No.:

	DATA EXC	EPTION REPORT	
Mo.Day Yr.  3-FEB-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
nstrument Type: GC/ECD	<b>Test / Method:</b> SW846 3541/8081B	Matrix Type: Solid	Client Code: WCHN
Batch ID: 365859	Sample Numbers: See Below		
otentially affected work ordentially affected work ordentially affected for Surrogates Specification and Requireme		DER Disposition:	
Exception Description:			gh on one column only due to the dilution
342714002 and 342714006.	ide of the acceptance limits in samples	necessary to analyze the s	ample. The data are reported.

Originator's Name:

Rebecca Enzor

13-FEB-14

Data Validator/Group Leader:

Cameron Bearden

14-FEB-14

Washington C	losure Hanfo	ord CHA	IN OF CUST	ODY/S	AMPL	E ANA	LYSI	S REQUI	EST	R	C-232-075		Page 1	of2
Collector	iouio mame	Compar	y Contact Kessner	Tele	phone No. -4688		F	Project Coordina KESSNER, J	tor	Price Co	de 8B	}	Data Turnaround	
JOHNSON, BRADY Project Designation 100-IU-2 & 100-IU-6 Rema	emina Maneta Sitas	Samplin	g Location 382 Subsites					RC-232	-	7 Day				
Ice Chest No. WCH -	17016	Field Lo	gbook No. 666-01		O603822	200		Method of Shipm Commerical		- fe	d EN	L		
Shipped To GEL Laboratories Charlsto	νn			3/0	49			Bill of Lading/Al	r Bill No.	5er (	25 PC	7		
Other Labs Shipped To	A.	L	•					0140						
NA			Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C						
,			Type of Container	G/P	aG	aG	₽G	æG				_		
POSSIBLE SAMPLE HAZ	ZARDS/REMARKS		No. of Container(s)	1	1	1	-1	1						
None			Volume	125mL	125mL	125mL	250mL	125mL						
Special Handling and/or	Storage 3714	**	Sample Analysis	See dem (1) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	Pesticide 8081; Chk Herbicide EPA815	PCBs - 8082						
Sample No.	Matrix	Sample Date	Sample Time	<b>经</b> 分别		10 E-1 30					Strain.			
J1T973	SOIL .	2.4.14	0820	×	X	X	X	X				-		
-J1T974	SOIL	2.4.14	0850	X	X	Х	X	X				_		
· J1T975	SOIL	2.4.14	0920	X	1	X	×	X						-
-J1T976	SOIL	2-4-14	0940	X	X	X	x	<u> </u>						
-J1T977	SOIL	2.4.14	1000	X	X	×	X	X						<u> </u>
Relinquished By/Removed From  Relinquished By/Removed From	Date/Time  2-4/14/  Date/Time 1530  1535  14 Date/Time 1030  14 2-5-14  Date/Time 1030  14 2-5-14  Date/Time	Received By/Stor	de la Detertion  2-4-14  ed la 2-4-14  ed la Date-tron  ad 2-5-14  ed la Detertion  the Control of the Control  ed la Detertion  de la Detertion  de la Detertion  Detertion  Detertion  Detertion  Detertion	753 A 15 1 100 C	(1) Call Sels	cium, Chromiu enium, Silkon	010TR (Cl	ose-out List) (Alur Copper, Iron, Lea dium, Vanadium,	ad Magr	resalm. Mai	nganese, moi	yooenun	JIEWED BY OO VIAC	Cadmium, trassium,

アントゥアつ

Washington Cl	osure Hanf	ord CH.	AIN OF CUST	ODY/S	AMPL	E ANA	LYS	S REQU	EST	RC-23	2-075	Page 2	of 2
Collector JOHNSON, BRADY		Comp	any Contact an Kessner		phone No. -4688			Project Coordina KESSNER,		Price Code		Data Turnaround	
Project Designation			ing Location	313	-1000	*****		SAF No.		8B		7 d	an
100-IU-2 & 100-IU-6 Remain	ing Waste Sites		0-382 Subsites		OA	-		RC-232 Method of Shipm					<b>-</b> ∮
Ice Chest No. WCH-/	2-016	EL-	.ogbook No. -1666-01		0603822	000		Commerical		- fea	Y31		
Shipped To GEL Laboratories Charlston			Property No. A 13	049				Bill of Lading/Ai	r Bill No.	e 05			
Other Labs Shipped To			Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 40	C Cool 4C					
			Type of Container	G/P	aG	aG	aG.	вG					
POSSIBLE SAMPLE HAZA	RDS/REMARKS		No. of Container(s)	1	1	1	1	1	Amazona Ana				
None			Volume	125mL	125mL	125mL	250ml	_ 125mL					
Special Handling and/or Storage			Sample Analysis	See item (1) in Special Instructions	TPH-Diesel Range - WTPH-0 +	PAHs - 8310	Pesticide 8081; Chi Herbicide EPA815	OFO- PCBs - 8082					
Sample No.	Matrix	Sample Dat	te   Sample Time	365		SACHEN		(4) 医卵巢		表现的		<b>发生产的</b>	(計算)
-J1T978	SOIL	2.4.14	0820	×	X	X	×	x					
J1T979	SOIL	2.4.14	0812	X				1	- 2-4	+14cm	46		
CHAIN OF BOS	SESSION		Sign/Brint Names	<u> </u>	SPEC	IAI INSTRI	ICTIONS			<u> </u>	L1		I
CHAIN OF POSSESSION  Reinquished By/Removed From  Data/Time  Received By/Stored in  Data/Time  Data/Time  Received By/Stored in  Data/Time  Data/Time						id, Magnesi	um, Manganes	e, Molybdenun	num, Boron, C n, Nickel, Pot	admium, assium,			
DISPOSITION						XPOC	14c	1					

## Appendix 5

**Data Validation Supporting Documentation** 

VALIDATION LEVEL:	Α	В	C	D	E
PROJECT: (	000-382		DATA PACKAG	E: XPOU	19
VALIDATOR:	ELR	LAB: C	2 (	DATE: 4	13/14
			SDG:	CPOUP9	
		ANALYSES	PERFORMED		
SW-846 8081	SW-846 8081 (TCLP)	W-846 8082	SW-846 8081 (TCLP)		
SAMPLES/MAT	RIX				
TITG	ر کر	115774	1179	7 <del>5</del> J	11952
11+57	<u>(</u> 1	17577	JITT	78	
71,11	<u> </u>	<u> </u>			
					Soil
Technical verifica	ation documentation	present?	CASE NARRATI		Yet No N/A
Initial calibration Continuing calib Standards traceal Standards expire Calculation chec	rations acceptable? ble?d?d k acceptable?breakdowns accept	able?			Yes No N/AYes No N/AYes No N/AYes No N/AYes No N/AYes No N/A

3. BLANKS (Levels B, C, D, and E)		
Calibration blanks analyzed? (Levels D, E)	Yes	No N
Calibration blank results acceptable? (Levels D, E)	Yes	No (N/
Laboratory blanks analyzed?	(V3)	No N/
Laboratory blank results acceptable?	(.Y)	No N/
Field/trip blanks analyzed? (Levels C, D, E)	Ye	NO) N/
Field/trip blank results acceptable? (Levels C, D, E)	Yes	No (N/
Transcription/calculation errors? (Levels D, E)	Yes	No N/
Comments:		
4. ACCURACY (Levels C, D, and E)		
Surrogates analyzed?	<b>~~</b>	No N/
Surrogate recoveries acceptable?		No N/
Surrogates traceable? (Levels D, E)		
Surrogates expired? (Levels D, E)		
MS/MSD samples analyzed?	X Y	
MS/MSD results acceptable?	Tjs	No N/
MS/MSD standards NIST traceable? (Levels D, E)	Yes	No(N
MS/MSD standards expired? (Levels D, E)	Yes	No TV
LCS/BSS samples analyzed?	( <u>Y</u>	No N/
LCS/BSS results acceptable?	Yòs	No N/
Standards traceable? (Levels D, E)	Yes	No N
Standards expired? (Levels D, E)	Yes	No N
Transcription/calculation errors? (Levels D, E)	Yes	No W
Performance audit sample(s) analyzed?	Yes	No N/
Performance audit sample results acceptable?	Yes	No(N/
Comments:		
w top us mod Les -	Jall	
	No P	<b>*</b>

RECISION (Levels C, D, and E)	
Ouplicate RPD values acceptable?	
Ouplicate results acceptable?	
MS/MSD standards NIST traceable? (Levels D, E)	Yes No NA
MS/MSD standards expired? (Levels D, E)	Yes No (N/A)
Field duplicate RPD values acceptable?	Yes No N/A
Field split RPD values acceptable?	Yes No(N/A)
Transcription/calculation errors? (Levels D, E)	Yes No (N/A)
Comments:	
no top us usp - Jall	
6. SYSTEM PERFORMANCE (Levels D and E)	
Chromatographic performance acceptable?	Yes No/N/A
Positive results resolved acceptably?	Yes No N/A
Comments:	
7. HOLDING TIMES (all levels)	
Samples properly preserved?	Yes No N/A
Sample holding times acceptable?	
Comments:	
Comments:	

	CTION LIMITS (all
levels)	
Compound identification acceptable? (Levels D, E)	<b>&gt;</b> \
Compound quantitation acceptable? (Levels D, E)	Yes No (N/A)
Results reported for all requested analyses?	\ / / _
Results supported in the raw data? (Levels D, E)	Yes No N/A
Samples properly prepared? (Levels D, E)	Yes No N/A
Detection limits meet RDL?	Yes No N/A
Transcription/calculation errors? (Levels D, E)	Yes No (N/A)
Comments:	
a pest ou	
9. SAMPLE CLEANUP (Levels D and E)	Var Na (VA
Fluoricil ® (or other absorbent) cleanup performed?	
Lot check performed?	,
Check recoveries acceptable?	1
GPC cleanup performed?	
GPC check performed?	7
GPC check recoveries acceptable?	
GPC calibration performed?	l l
GPC calibration check performed?	4
GPC calibration check retention times acceptable?	
Check/calibration materials traceable?	Yes No N/A
Check/calibration materials Expired?	
Analytical batch QC given similar cleanup?	Yes No N/A
Transcription/Calculation Errors?	Yes Nd N/A
Comments:	$\overline{}$

## Appendix 6

Additional Documentation Requested by Client

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

Report Date: February 13, 2014

Page 1 of 2

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder: 342714

Project Description: RC-232 Soil

Workorder: 342714	Client SDG: XI	20049		Proje	ct Descrip	tion: RC-2	32 Soil		
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anls	t Date Time
Semi-Volatiles-PCB Batch 1366122									
QC1203034434 LCS Aroclor-1016	33.3			25.0	ug/kg		75.1	(39%-120%) J	KM 02/13/14 07:38
Aroclor-1260	33.3			30.4	ug/kg		91.1	(50%-116%)	
**4cmx	6.67			5.79	ug/kg		86.8	(44%-106%)	
**Decachlorobiphenyl	6.67			6.28	ug/kg		94.2	(35%-119%)	
QC1203034433 MB Aroclor-1016			U	1.11	ug/kg				02/13/14 07:26
Aroclor-1221			U	1.11	ug/kg				
Aroclor-1232			U	1.11	ug/kg				
Aroclor-1242			U	1.11	ug/kg				
Aroclor-1248			U	1.11	ug/kg				
Aroclor-1254			U	1.11	ug/kg				
Aroclor-1260			U	1.11	ug/kg				
**4cmx	6.67			5.84	ug/kg		87.6	(44%-106%)	
**Decachlorobiphenyl	6.67			6.91	ug/kg		104	(35%-119%)	
QC1203034437 342714005 MS Aroclor-1016		DU 22.	8 DJ	32.8	ug/kg		95.7	(25%-125%)	02/13/14 09:03
Aroclor-1260	34.3	DU 22.	8 DJ	35.6	ug/kg	;	104	(28%-127%)	
**4cmx	6.85	5.8	5	5.82	ug/kg	;	84.9	(44%-106%)	
**Decachlorobiphenyl	6.85	7.6	0	7.02	ug/kg	}	103	(35%-119%)	
QC1203034438 342714005 MS Aroclor-1016		DU 22	.8 DJ	32.5	ug/kg	g 0.895	95.1	(0%-30%)	02/13/14 09:17

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

Workorder: 342714	Client SDG: XP0049	,		Proj	ect Descrip	tion: RC-2	232 Soil			Page 2 of 2
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range A	nlst	Date Time
Semi-Volatiles-PCB Batch 1366122										
Aroclor-1260	34.2 DU	22.8	DJ	35.5	ug/kg	0.208	104	(0%-30%)		
**4cmx	6.84	5.85		5.69	ug/kg		83.2	(44%-106%)	JXM	02/13/14 09:17
**Decachlorobiphenyl	6.84	7.60		7.15	ug/kg		105	(35%-119%)		

#### Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

^{*} Indicates that a Quality Control parameter was not within specifications.

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## **QC Summary**

Report Date: February 14, 2014

Page 1 of 5

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder: 342714

Client SDG:	XP0049	Project Description:	RC-232 Soil

Parmname	NOM	Sample Qual	QC	Units	RPD% REC%	Range Anist	Date Time
Semi-Volatiles-Pesticide Batch 1365859			***	***************************************			and the second s
QC1203033721 LCS 4,4'-DDD	41.6		38.3	ug/kg	92.1	(51%-124%) RXE1	02/12/14 20:58
4,4'-DDE	41.6		36.9	ug/kg	88.8	(51%-119%)	
4,4'-DDT	41.6		38.0	ug/kg	91.2	(50%-128%)	
Aldrin	16.6		13.7	ug/kg	82.3	(48%-113%)	
Dieldrin	41.6		33.2	ug/kg	79.7	(51%-112%)	
Endosulfan I	16.6		12.8	ug/kg	76.6	(43%-110%)	
Endosulfan II	41.6		32.2	ug/kg	77.4	(49%-111%)	
Endosulfan sulfate	41.6		37.6	ug/kg	90.3	(54%-121%)	
Endrin	41.6		41.3	ug/kg	99.3	(54%-134%)	
Endrin aldehyde	41.6		36.1	ug/kg	86.9	(49%-117%)	
Endrin ketone	41.6		33.0	ug/kg	79.4	(48%-110%)	
Heptachlor	16.6		14.1	ug/kg	84.8	(52%-117%)	
Heptachlor epoxide	16.6		13.6	ug/kg	81.6	(53%-115%)	
Methoxychlor	166		154	ug/kg	92.7	(48%-117%)	
alpha-BHC	16.6		14.0	ug/kg	84.2	(50%-122%)	
alpha-Chlordane	16.6		13.8	ug/kg	82.8	(52%-113%)	
beta-BHC	16.6		14.4	ug/kg	86.5	(54%-110%)	
delta-BHC	16.6		14.8	ug/kg	89	(53%-117%)	
gamma-BHC (Lindane)	16.6		14.0	ug/kg	84.2	(53%-120%)	
gamma-Chlordane	16.6		15.2	ug/kg	91.6	(52%-117%)	

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**QC Summary** 

Workorder: 342714	Client SDG: XP00	<u>QC Su</u>			tion: RC-2	232 Soil		Page 2 of
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range Anist	Date Time
Semi-Volatiles-Pesticide Batch 1365859								
*4cmx	33.3		27.5	ug/kg		82.7	(32%-120%) RXE	02/12/14 20:5
*Decachlorobiphenyl	33.3		28.9	ug/kg		86.8	(37%-129%)	
QC1203033720 MB 4,4'-DDD		U	0.333	ug/kg				02/12/14 20:4:
4,4'-DDE		U	0.333	ug/kg				
4,4'-DDT		U	0.333	ug/kg				
Aldrin		U	0.166	ug/kg				
Dieldrin		U	0.333	ug/kg				
Endosulfan I		U	0.166	ug/kg				
Endosulfan II		U	0.333	ug/kg				
Endosulfan sulfate		ប	0.333	ug/kg				
Endrin		U	0.333	ug/kg				
Endrin aldehyde		U	0.333	ug/kg				
Endrin ketone		U	0.333	ug/kg				
Heptachlor		U	, 0.166	ug/kg				
Heptachlor epoxide		U	0.166	ug/kg				
Methoxychlor		U	1.66	ug/kg				
Toxaphene		U	5.54	ug/kg				
alpha-BHC		U	0.166	ug/kg				
alpha-Chlordane		U	0.166	ug/kg				
beta-BHC		U	0.166	ug/kg				
delta-BHC		U	0.166	ug/kg				

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## **QC Summary**

		<u>.</u>	C Oullima,		tion: RC-232 Soil		
Workorder: 342714	Client SDG: XP00					Dange Aniet	Page 3 of 5  Date Time
Parmname	NOM	Sample Q	lual QC	Units	RPD% REC%	6 Range Anist	Date Time
Semi-Volatiles-Pesticide Batch 1365859							
gamma-BHC (Lindane)		1	U 0.166	ug/kg		RXEI	02/12/14 20:43
gamma-Chlordane		1	U 0.166	ug/kg			
**4cmx	33.3		26.3	ug/kg	79.2	(32%-120%)	
**Decachlorobiphenyl	33.3		26.8	ug/kg	80.5	(37%-129%)	
QC1203033722 342714001 MS 4,4'-DDD	42.4 DU	3.39	D 38.7	ug/kg	91.4	(37%-134%)	02/12/14 21:27
4,4'-DDE	42.4 DU	3.39	D 38.5	ug/kg	- 91	(33%-133%)	
4,4'-DDT	42.4 DU	3.39	D 31.5	ug/kg	74.4	(21%-149%)	
Aldrin	16.9 DU	1.70	D 14.5	ug/kg	85.8	(34%-134%)	
Dieldrin	42.4 DU	3.39	D 33.5	ug/kg	79.1	(36%-132%)	
Endosulfan l	16.9 DU	1.70	D 12.8	ug/kg	75.7	(36%-125%)	
Endosulfan II	42.4 DU	3.39	D 29.1	ug/kg	68.6	(37%-129%)	
Endosulfan sulfate	42.4 DU	3.39	D 32.2	ug/kg	76	(31%-140%)	
Endrin	42.4 DU	3.39	D 41.4	ug/kg	97.7	(45%-142%)	
Endrin aldehyde	42.4 DU	3.39	D 26.1	ug/kg	61.6	(31%-133%)	
Endrin ketone	42.4 DU	3.39	D 30.4	ug/kg	71.8	(30%-139%)	
Heptachlor	16.9 DU	1.70	D 16.0	ug/kg	94.4	(32%-137%)	
Heptachlor epoxide	16.9 DU	1.70	D 13.3	ug/kg	78.7	(36%-130%)	
Methoxychlor	169 DU	J 17.0	D 152	ug/kg	89.6	(28%-143%)	
alpha-BHC	16.9 DU	J 1.70	D 16.1	ug/kg	95	(37%-129%)	
alpha-Chlordane	16.9 DU	J 1.70	D 14.5	ug/kg	85.7	(29%-141%)	
beta-BHC	16.9 DU	J 1.70	D 14.6	ug/kg	86.3	(33%-136%)	

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**QC Summary** 

	******		<u>/C 50</u>	Dunie	<u>.Y.</u> ect Descript	tion: DC 1	naa Soil		D 4 . 6 6
Workorder: 342714	Client SDG: XP00					RPD%	REC%	Range Anlst	Page 4 of 5  Date Time
Parmname Semi-Volatiles-Pesticide	NOM	Sample	Qual	QC	Units	KFD76	REC 78	Range Amst	Date Time
Batch 1365859									
delta-BHC	16.9 DU	1.70	D	12.9	ug/kg		76.1	(37%-136%) RXE1	02/12/14 21:27
gamma-BHC (Lindane)	16.9 DU	1.70	D	16.1	ug/kg		95.2	(35%-130%)	
gamma-Chlordane	16.9 DU	. 1.70	D	14.8	ug/kg		87.1	(30%-139%)	
**4cmx	33.9	39.8		40.4	ug/kg		119	(32%-120%)	
**Decachlorobiphenyl	33.9	38.5		36.4	ug/kg		107	(37%-129%)	
QC1203033723 342714001 MSD 4,4'-DDD	42.4 DU	3.39	D	39.2	ug/kg	1.30	92.4	(0%-30%)	02/12/14 21:42
4,4'-DDE	42.4 DU	3.39	D	39.8	ug/kg	3.16	93.7	(0%-30%)	
4,4'-DDT	42.4 DU	3.39	<b>D</b> .	31.9	ug/kg	1.13	75.1	(0%-30%)	
Aldrin	17.0 DU	1.70	D	14.8	ug/kg	1.78	87.2	(0%-30%)	
Dieldrin	42.4 DU	3.39	D	33.7	ug/kg	0.520	79.4	(0%-30%)	
Endosulfan I	17.0 DU	1.70	D	13.1	ug/kg	2.00	77.1	(0%-30%)	
Endosulfan II	42.4 DU	3.39	D	30.4	ug/kg	4.33	71.6	(0%-30%)	
Endosulfan sulfate	42.4 DU	3.39	D	34.0	ug/kg	5.39	80.1	(0%-30%)	
Endrin	42.4 DU	3.39	D	40.7	ug/kg	1.61	96	(0%-30%)	
Endrin aldehyde	42.4 DU	3.39	D D	26.9	ug/kg	3.11	63.4	(0%-30%)	
Endrin ketone	<b>42.4</b> DU	3.39	D	31.0	ug/kg	1.82	73	(0%-30%)	
Heptachlor	17.0 DU	1.70	D D	15.3	ug/kg	4.16	90.4	(0%-30%)	
Heptachlor epoxide	17.0 DU		) D	13.4	ug/kg		78.7	(0%-30%)	
Methoxychlor	170 DU		) D	152	ug/kg		89.7	(0%-30%)	
alpha-BHC	17.0 DU		0 D	16.1	ug/kg		94.8	(0%-30%)	
alpha-Chlordane	17.0 DU	1.70	0 D	14.8	ug/kg	2.02	87.3	(0%-30%)	

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## **QC Summary**

Workorder:	342714	Client SDG:	Client SDG: XP0049 Project Description: RC-232 Soil							Pag	ge 5 of 5		
Parmname		NOM	1	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
Semi-Volatiles-I Batch	<b>Pesticide</b> 1365859												
beta-BHC		17.0	DU	1.70	D	14.4	ug/kg	1.70	84.7	(0%-30%)	RXE1	02/12/	14 21:42
delta-BHC		17.0	DU	1.70	D	12.8	ug/kg	0.758	75.4	(0%-30%)	)		
gamma-BHC	(Lindane)	17.0	DU	1.70	D	15.9	ug/kg	1.74	93.4	(0%-30%	)		
gamma-Chlore	dane	17.0	ĐU	1.70	D	14.8	ug/kg	0.396	87.3	(0%-30%	)		
**4cmx		34.0		39.8		39.9	ug/kg		118	(32%-120%	)		
**Decachlorobij	ohenyl	34.0		38.5		35.0	ug/kg		103	(37%-129%	)		

#### Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- o Analyte failed to recover within LCS limits (0rganics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

[^] The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

^{*} Indicates that a Quality Control parameter was not within specifications.

Date:

14 April 2014

To:

Washington Closure Hanford Inc. (technical representative)

From:

**ELR Consulting** 

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil Full Protocol - Waste Site

600-382

Subject:

Inorganic - Data Package No. XP0049-GEL

## INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0049 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1T973	2/4/14	Soil	С	See note 1
J1T974	2/4/14	Soil	С	See note 1
J1T975	2/4/14	Soil	С	See note 1
J1T976	2/4/14	Soil	С	See note 1
J1T977	2/4/14	Soil	C	See note 1
J1T978	2/4/14	Soil	C	See note 1
J1T979	2/4/14	Soil	С	See note 1

^{1 -} Metals by 6010C & mercury by 7471B.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custcdy Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Documentation Requested by Client

## **DATA QUALITY PARAMETERS**

## Holding Times

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals and 28 days for mercury.

All holding times were acceptable.

## Preparation (Method) Blanks

## Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "UJ". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the contract required detection limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the instrument detection limit (IDL) and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

Due to method blank contamination, the zinc result in sample J1T979 was qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

## Field (Equipment) Blank

One field blank (J1T979) was submitted for analysis. Ten analytes were detected in the field blank. Under the WCH statement of work, no qualification is required.

## Accuracy

## Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 75% to 125%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 125% or less than 74% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 125% and a sample result less than the IDL, no qualification is required.

Due to a matrix spike recovery outside QC limits, all silicon (0%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

## · Precision

## Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than 30%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All laboratory duplicate results were acceptable.

## Field Duplicate

One set field duplicates (J1T973/J1T978) were submitted for analysis. Laboratory duplicates are compared using the same criteria as for laboratory results. The RPD for silicon (35.8%) we outside QC limits. Under the WCH statement of work, no qualification is required. All other field duplicate results are acceptable.

## Analytical Detection Levels

Reported analytical detection levels are compared against the 100 Area RQLs to ensure that laboratory detection levels meet the required criteria. All results met the RQL.

## Completeness

Data package No. XP0049 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

## **MAJOR DEFICIENCIES**

None found.

## **MINOR DEFICIENCIES**

The following minor deficiencies were noted:

- Due to method blank contamination, the zinc result in sample J1T979 was qualified as undetected and flagged "UJ".
- Due to a matrix spike recovery outside QC limits, all silicon (0%) results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

## **REFERENCES**

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

# Appendix 1 Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

# Appendix 2 Summary of Data Qualification

## INORGANICS DATA QUALIFICATION SUMMARY*

SDG: XP0049	REVIEWER: ELR	Project: 600-382	PAGE_1_OF_1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Zinc	J	J1T979	Method blank contamination
Silicon	J	All	MS recovery

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

# Appendix 3 Annotated Laboratory Reports

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project: Joan Kessner

Client SDG: XP0049

Client Sample ID: J1T973

RC-232 Soil

Sample ID:

342714001

Project: Client ID: WCHN00213 WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:20

Receive Date:

07-FEB-14

Collector:

Client 1.85%

SW846 3050B Prep for 6010C

SW846 7471B Mercury Prep Soil

Moisture:

4/13/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analy	st Date	Tin	ne Batch	Method
Mercury Analysis-	CVAA								*********		
SW846 7471B Mer	cury in Solid "Dr	Weight Corre	cted"								
Mercury	*U	0.00398	0.00398	0.0119	mg/kg	1	NOR1	02/11/14	1004	1365640	1
Metals Analysis-IC	p										•
ICP METALS 601		t "Dry Weight	Corrected"								
Aluminum	o a a construction of the	7160	5.89	17.3	mg/kg	1	HSC	02/12/14	1409	1365353	2
Arsenic	В	1.63	0.433	2.60	mg/kg	1		02/12/11	. 107	1500555	-
Barium		78.4	0.0866	0.433	mg/kg						
Beryllium		0.694	0.0866	0.433	mg/kg	. 1					
Boron	U	0.866	0.866	4.33	mg/kg	1					
Cadmium	В	0.113	0.0866	0.433	mg/kg	i					
Calcium		2800	6.93	21.7	mg/kg	1					
Chromium		11.5	0.130	0.433	mg/kg	1					
Copper		11.9	0.260	0.866	mg/kg	1					
Iron		21500	6.93	21.7	mg/kg	1					
Magnesium		3920	7.36	26.0	mg/kg	1					
Manganese		359	0.173	0.866	mg/kg	1					
Molybdenum	В	0.248	0.173	0.866	mg/kg	1					
Nickel		11.3	0.130	0.433	mg/kg	1					
Silicon	N .	931	1.30	8.66	mg/kg	1					
Potassium	•	1420	5.54	21.7	mg/kg	1	HSC	02/13/14	0926	1365353	3
Silver	U	0.0866	0.0866	0.433	mg/kg	1					
Sodium		108	6.06	21.7	mg/kg	1					
Antimony	DU	1.43	1.43	4.33	mg/kg	5	HSC	02/14/14	1033	1365353	4
Cobalt	D	8.90	0.650	2.17	mg/kg	5					
Lead	BD	4.11	1.43	4.33	mg/kg	5					
Vanadium	D	57.9	0.433	2.17	mg/kg	5					
Zinc	D	39.8	1.73	4.33	mg/kg	5					
Metals Analysis-IC	P-MS										
SW846 3050B/602	0A Selenium "Dry	Weight Corre	cted"								
Selenium	DU	0.327	0.327	1.00	mg/kg	2	SKJ	02/12/14	0327	1365351	5
The following Prep	Methods were pe	rformed:									
Method	Description			Analyst	Date	Tim	e P	rep Batch	1		
SW846 3050B	ICP-MS 3050			MTMI	02/10/14	0900		365350			

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SW846 3050B

SW846 7471B Prep

MTMI

AXS5

02/10/14

02/10/14

0900

1653

1365352

1365636

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## **Certificate of Analysis**

Report Date: February 18, 2014

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Client Sample ID: J1T974

Project: Client ID:

WCHN00213 WCHN001

Sample ID:

342714002

Matrix:

SOIL

Collect Date:

04-FEB-14 08:50

Receive Date: Collector:

07-FEB-14

Moisture:

Client

14.8%

4/13/14

Parameter	Qualifier	Result	DL	RL	Units	DF A	nalyst Da	te 7	Time Batch	Method
Mercury Analysis-C	VAA		Art	The second secon		······································				
SW846 7471B Merc	ury in Solid "Dr	v Weight Corr	ected"							
Mercury	*B	0.00768	0.00464	0.0138	mg/kg	1 N	NOR1 02/11/	14 16	114 1266640	
Metals Analysis-ICP			0.00707	0.0130			VOKT 02/11/	14 10	710 1303040	1
ICP METALS 60107		st "Dry Weigh	t Corrected"							
Aluminum		9530	7.38	21.7	mg/kg	1 1	ISC 02/12/1	4 14	27 1365353	•
Arsenic	В	2.92	0.543	3.26	mg/kg	1 17	130 02/12/1	4 14	127 (303333	2
Barium		107	0.109	0.543	mg/kg	1				
Beryllium		0.766	0.109	0.543	mg/kg	1				
Boron	U	1.09	1.09	5.43	mg/kg	1				
Cadmium	В	0.124	0.109	0.543	mg/kg	1				
Calcium		3540	8.68	27.1	mg/kg	i				
Chromium		13.8	0.163	0.543	mg/kg	1				
Copper		17.0	0.326	1.09	mg/kg	i				
Iron		22600	8.68	27.1	mg/kg	i				
Magnesium		4940	9.22	32.6	mg/kg	1				
Manganese		389	0.217	1.09	mg/kg	1				
Molybdenum	В	0.284	0.217	1.09	mg/kg	1				
Nickel		13.6	0.163	0.543	mg/kg	}				
Silicon	N	J 698	1.63	10.9	mg/kg	ì				
Potassium		2440	6.95	27.1	mg/kg	1 H	ISC 02/13/1	4 09	44 1365353	3
Silver	U	0.109	0.109	0.543	mg/kg	1				_
Sodium		138	7.60	27.1	mg/kg	1				
Antimony	DU	1.79	1.79	5.43	mg/kg	5 H	SC 02/14/1	4 10	56 1365353	4
Cobalt	D	9.19	0.814	2.71	mg/kg	5				
Lead	BD	4.62	1.79	5.43	mg/kg	5				
Vanadium	D	49.3	0.543	2.71	mg/kg	5				
Zinc	D	45.5	2.17	5.43	mg/kg	5				
Metals Analysis-ICP										
SW846 3050B/6020A	A Selenium "Dr	Weight Corre	ected"							
Selenium	DU	0.381	0.381	1.16	mg/kg	2 SI	KJ 02/12/1	4 04	15 1365351	5
The following Prep M	1ethods were pe	rformed:								
Method	Description			Analyst	Date	Time	Prep Bat	ch		
SW846 3050B	ICP-MS 3050	BS PREP		MTM1	02/10/14	0900	1365350			
SW846 3050B	SW846 3050E	Prep for 6010C		MTM1	02/10/14	0900	1365352			
SW846 7471B Prep	SW846 7471E	Mercury Prep So	il	AXS5	02/10/14	1653	1365636			

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/10/14	0900	1365350
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/10/14	0900	1365352
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/10/14	1653	1365636

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## Certificate of Analysis

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

Client Sample ID: J1T975

RC-232 Soil

Project:

Sample ID:

342714003

Client ID:

Client SDG: XP0049

WCHN00213 WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 09:20

Receive Date:

07-FEB-14

SW846 7471B Mercury Prep Soil

Collector: Moisture: Client 9.67%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analy	st Date	Tin	ne Batch	Method
Mercury Analysis	-CVAA										
SW846 7471B Me	ercury in Solid "Dr	y Weight Correc	cted"								
Mercury	*	0.169	0.00437	0.013	mg/kg	1	NORI	02/11/14	1017	1365640	1
Metals Analysis-I	CP										
-	10TR Close-out Li	st "Dry Weight (	Corrected"								
Aluminum		7370	7.22	21.2	mg/kg	1	HSC	02/12/14	1430	1365353	2
Arsenic	В	2.96	0.531	3.19	mg/kg	ı					
Barium		87.9	0.106	0.531	mg/kg	1					
Beryllium		0.662	0.106	0.531	mg/kg	1					
Boron	U	1.06	1.06	5.31	mg/kg	1					
Cadmium	В	0.106	0.106	0.531	mg/kg	1					
Calcium		2940	8.50	26.6	mg/kg	1					
Chromium		12.9	0.159	0.531	mg/kg	1					
Copper		12.3	0.319	1.06	mg/kg	1					
Iron		20900	8.50	26.6	mg/kg	1					
Magnesium		4240	9.03	31.9	mg/kg	1					
Manganese		376	0.212	1.06	mg/kg	1					
Molybdenum	U	0.212	0.212	1,06	mg/kg	1					
Nickel		J 11.6	0.159	0.531	mg/kg	1					
Silicon	N	J 567	1.59	10.6	mg/kg	1					
Potassium		2010	6.80	26.6	mg/kg	1	HSC	02/13/14	0946	1365353	3
Silver	U	0.106	0.106	0.531	mg/kg	l					
Sodium		99.7	7.44	26.6	mg/kg	1					
Antimony	DU	1.75	1.75	5.31	mg/kg	5	HSC	02/14/14	1059	1365353	4
Cobalt	D	9.20	0.797	2.66	mg/kg	5					
Lead	BD	4.58	1.75	5.31	mg/kg	5					
Vanadium	D	52.4	0.531	2.66	mg/kg	5					
Zinc	D	43.1	2.12	5.31	mg/kg	5					
Metals Analysis-I	CP-MS										
SW846 3050B/60	20A Selenium "Dr	y Weight Correc	eted"								
Selenium	DU	0.350	0.350	1.06	mg/kg	2	SKJ	02/12/14	0421	1365351	5
The following Pre	ep Methods were pe	erformed:									
Method	Description	1		Analyst	Date	Tim	e Pi	rep Batch	1		
SW846 3050B	ICP-MS 3050	BS PREP		MTM1	02/10/14	0900		365350	-		
SW846 3050B	SW846 3050	B Prep for 6010C		MTM1	02/10/14	0900	13	365352			
		-									

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SW846 7471B Prep

AXS5

02/10/14

1653

1365636

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## **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

Client SDG: XP0049

Client Sample ID: J1T976

RC-232 Soil

Project:

WCHN00213

Sample ID:

342714004

SOIL

Client ID:

WCHN001

Matrix:

Collect Date:

04-FEB-14 09:40

Receive Date:

07-FEB-14

Collector: Moisture:

Client 3.47%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analy	st Date	Tin	ne Batch	Method
Mercury Analysis-C	VAA										********
SW846 7471B Merc	ury in Solid "Di	y Weight Correcte	d"								
Mercury	*U	0.00409	0.00409	0.0122	mg/kg	1	NOR1	02/11/14	1019	1365640	ì
Metals Analysis-ICF	,				0 0						•
ICP METALS 6010	TR Close-out Li	st "Dry Weight Co	prected"								
Aluminum		7880	6.81	20.0	mg/kg	1	HSC	02/12/14	1432	1365353	2
Arsenic	В	2.26	0.501	3.01	mg/kg	1	1150	02/12/14	1432	1302333	2
Barium	-	94.7	0.100	0.501	mg/kg	1					
Beryllium		0.654	0.100	0.501	mg/kg	í					
Boron	U	1.00	1.00	5.01	mg/kg	1					
Cadmium	В	0.103	0.100	0.501	mg/kg	1					
Calcium		3040	8.01	25.0	mg/kg	1					
Chromium		13.1	0.150	0.501	mg/kg	1					
Copper		12.3	0.301	1.00	mg/kg	1					
Iron		20700	8.01	25.0	mg/kg	1					
Magnesium		4310	8.52	30.1	mg/kg	1					
Manganese		362	0.200	1.00	mg/kg	1					
Molybdenum	В	0.326	0.200	1.00	mg/kg	1					
Nickel		11.3	0.150	0.501	mg/kg	1					
Silicon	N 3	J 558	1.50	10.0	mg/kg	1					
Potassium		2210	6.41	25.0	mg/kg	1	HSC	02/13/14	0949	1365353	3
Silver	U	0.100	0.100	0.501	mg/kg	1					
Sodium		114	7.01	25.0	mg/kg	1					
Antimony	DU	1.65	1.65	5.01	mg/kg	5	HSC	02/14/14	1102	1365353	4
Cobalt	D	8.92	0.751	2.50	mg/kg	5					
Lead	D	5.41	1.65	5.01	mg/kg	5					
Vanadium	D	49.0	0.501	2.50	mg/kg	5					
Zinc	D	49.5	2.00	5.01	mg/kg	5					
Metals Analysis-ICP											
SW846 3050B/6020	A Selenium "Dr	y Weight Correcte	d"		•						
Selenium	DU	0.341	0.341	1.03	mg/kg	2	SKJ	02/12/14	0427	1365351	5
The following Prep !	Methods were pe	erformed:									
Method	Description	1		Analyst	Date	Tim	e P	rep Batch			
SW846 3050B	ICP-MS 3050			MTMI	02/10/14	0900		365350			
SW846 3050B		3 Prep for 6010C		MTM1	02/10/14	0900		365352			
SW846 7471B Prep		B Mercury Prep Soil		AXS5	02/10/14	1653		365636			

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## **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

WCHN00213

Client Sample ID: J1T977 Sample ID:

342714005

Client ID:

WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 10:00

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

2.76%

V4/13/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analy	st Date	Tin	ne Batch	Method
Mercury Analysis-CVA	4										
SW846 7471B Mercury	in Solid "Dr	y Weight Corre	cted"								
Mercury	<b>+</b> ∪	0.00371	0.00371	0.0111	mg/kg	1	NOR1	02/11/14	1021	1365640	1
Metals Analysis-ICP											
ICP METALS 6010TR C	Close-out Lis	st "Dry Weight	Corrected"								
Aluminum		5600	6.38	18.8	mg/kg	1	HSC	02/12/14	1435	1365353	2
Arsenic	В	1.48	0.469	2.81	mg/kg	1					
Barium		54.9	0.0938	0.469	mg/kg	ı					
Beryllium	В	0.441	0.0938	0.469	mg/kg	1					
Boron	U	0.938	0.938	4.69	mg/kg	1					
Cadmium	U	0.0938	0.0938	0.469	mg/kg	1					
Calcium		2700	7.51	23.5	mg/kg	1					
Chromium		11.3	0.141	0.469	mg/kg	1					
Cobalt		5.52	0.141	0.469	mg/kg	1					
Copper		8.95	0.281	0.938	mg/kg	1					
Iron		16100	7.51	23.5	mg/kg	1					
Lead		1.50	0.310	0.938	mg/kg	1					
Magnesium		3530	7.98	28.1	mg/kg	1					
Manganese		257	0.188	0.938	mg/kg	1				•	
Molybdenum	U	0.188	0.188	0.938	mg/kg	1					
Nickel		_ 9.17	0.141	0.469	mg/kg	1					
Silicon	N	J 430	1.41	9.38	mg/kg	1					
Vanadium		38.5	0.0938	0.469	mg/kg	1					
Zine		32.5	0.375	0.938	mg/kg	1					
Potassium		1150	6.01	23.5	mg/kg	1	HSC	02/13/14	0951	1365353	3
Silver	U	0.0938	0.0938	0.469	mg/kg	1					
Sodium		88.9	6.57	23.5	mg/kg	1					
Antimony	DU	1.55	1.55	4.69	mg/kg	5	HSC	02/14/14	1105	1365353	4
Metals Analysis-ICP-MS	6										
SW846 3050B/6020A Se	elenium "Dr	Weight Corre	cted"								
Selenium	DU	0.331	0.331	1.00	mg/kg	2	SKJ	02/12/14	0433	1365351	5
The following Prep Meth	nods were pe	rformed:									
Method	Description	l		Analyst	Date	Tim	e P	rep Batch	1		
SW846 3050B	ICP-MS 3050		<del></del>	MTM1	02/10/14	0900		365350			
SW846 3050B	SW846 3050E	Prep for 6010C		MTM1	02/10/14	0900		365352			
SW846 7471B Prep	SW846 7471E	Mercury Prep Soi	1	AXS5	02/10/14	1653		365636			

Page 130 of 149

#### **GEL LABORATORIES LLC**

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

#### **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project:

Sample ID:

Client Sample ID: J1T978 342714006

Client ID:

WCHN00213 WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:20

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

1.72%

Parameter	Qualifier	Result	DL	RL	Units	DF	Analy	st Date	Tin	ne Batch	Method
Mercury Analysis-CVA	A							er analysis and enter community			
SW846 7471B Mercury	in Solid "Dr	y Weight Corr	ected"								
Mercury	•U	0.00398	0.00398	0.0119	mg/kg	1	NOR1	02/11/14	1022	1365640	1
Metals Analysis-ICP					• •						
ICP METALS 6010TR	Close-out Lis	st "Dry Weigh	t Corrected"								
Aluminum		6860	6.80	20.0	mg/kg	1	HSC	02/12/14	1438	1365353	2
Arsenic	В	2.60	0.500	3.00	mg/kg	1					
Barium		70.8	0.100	0.500	mg/kg	1					
Beryllium		0.620	0.100	0.500	mg/kg	1					
Boron	U	1.00	1.00	5.00	mg/kg	1					
Cadmium	U	0.100	0.100	0.500	mg/kg	1					
Calcium		2570	8.00	25.0	mg/kg	1					
Chromium		11.3	0.150	0.500	mg/kg	i					
Copper		11.5	0.300	1.00	mg/kg	1					
Iron		20600	8.00	25.0	mg/kg	1					
Magnesium		3780	8.50	30.0	mg/kg	1					
Manganese		308	0.200	1.00	mg/kg	1					
Molybdenum	В	0.305	0.200	1.00	mg/kg	1					
Nickel		10.4	0.150	0.500	mg/kg	l					
Silicon	N	648	1.50	10.0	mg/kg	1					
Potassium	· ·	1400	6.40	25.0	mg/kg	1	HSC	02/13/14	0954	1365353	3
Silver	U	0.100	0.100	0.500	mg/kg	1					
Sodium		97.6	7.00	25.0	mg/kg	1					
Antimony	DU	1.65	1.65	5.00	mg/kg	5	HSC	02/14/14	1108	1365353	4
Cobalt	D	7.76	0.750	2.50	mg/kg	5					
Lead	BD	4.40	1.65	5.00	mg/kg	5					
Vanadium	D	50.6	0.500	2.50	mg/kg	5					
Zinc	D	35.4	2.00	5.00	mg/kg	5					
Metals Analysis-ICP-M	S										
SW846 3050B/6020A S	elenium "Dry	Weight Corr	ected"								
Selenium	DU	0.334	0.334	1.01	mg/kg	2	SKJ	02/12/14	0439	1365351	5
The following Prep Met	hods were pe	rformed:									
Method	Description	l	· · · · · · · · · · · · · · · · · · ·	Analyst	Date	Time	e P	rep Batch	1		
SW846 3050B	ICP-MS 3050			MTM1	02/10/14	0900		65350			
SW846 3050B	SW846 3050E	3 Prep for 6010C		MTM!	02/10/14	0900		65352			
SW846 7471B Prep	SW846 7471E	B Mercury Prep Se	oil	AXS5	02/10/14	1653		65636			

#### **GEL LABORATORIES LLC**

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Client Sample ID: J1T979

Project:

Sample ID:

342714007

Client ID:

WCHN00213 WCHN001

Matrix:

SOIL

Collect Date:

04-FEB-14 08:15

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

< 0.1%

Parameter	Qualifier	Result	DL	RL	Units	DF A	nalyst Date	Tim	e Batch	Method
Mercury Analysis-CV	'AA									
SW846 7471B Mercu	ry in Solid "Dr	Weight Correct	ted"							
Mercury	*U	0.00373	0.00373	0.0111	mg/kg	1 N	OR1 02/11/14	1024	1365640	1
Metals Analysis-ICP						, ,	04/11/17	1021	1303040	
ICP METALS 6010T	R Close-out Lis	t "Dry Weight C	orrected"							
Aluminum		128	6.49	19.1	mg/kg	1 11	SC 02/12/14	1440	1365353	2
Arsenic	U	0.477	0.477	2.86	mg/kg	1	02/12/14	1770	1303333	-
Barium		2.22	0.0954	0.477	mg/kg	1				
Beryllium	U	0.0954	0.0954	0.477	mg/kg	1				
Boron	U	0.954	0.954	4.77	mg/kg	i				
Cadmium	U	0.0954	0.0954	0.477	mg/kg	i				
Calcium		99.2	7.64	23.9	mg/kg	1				
Chromium	U	0.143	0.143	0.477	mg/kg	1				
Copper	U	0.286	0.286	0.954	mg/kg	1				
Iron		298	7.64	23.9	mg/kg	i				
Magnesium		49.5	8.11	28.6	mg/kg	1				
Manganese		7.82	0.191	0.954	mg/kg	1				
Molybdenum	U	0.191	0.191	0.954	mg/kg	1				
Nickel	U	0.143	0.143	0.477	mg/kg	1				
Silicon	ΝJ		1.43	9.54	mg/kg	1				
Silver	U	0.0954	0.0954	0.477	mg/kg	1 H	SC 02/13/14	0957	1365353	3
Sodium	U	6.68	6.68	23.9	mg/kg	1				
Antimony	Ų	0.315	0.315	0.954	mg/kg	1 H	SC 02/14/14	1112	1365353	4
Cobalt	U	0.143	0.143	0.477	mg/kg	1				
Lead •	В	0.744	0.315	0.954	mg/kg	1				
Potassium		56.9	6.11	23.9	mg/kg	1				
Vanadium	В	0.387	0.0954	0.477	mg/kg	1				
Zinc	c <b>v</b>	<b>3</b> 1.76	0.382	0.954	mg/kg	1				
Metals Analysis-ICP-										
SW846 3050B/6020A	Selenium "Dry	Weight Correct	ed"							
Selenium	DU	0.308	0.308	1.00	mg/kg	2 SI	CJ 02/12/14	0445	1365351	5
The following Prep M	ethods were per	rformed:								
Method	Description			Analyst	Date	Time	Prep Batch			
SW846 3050B	ICP-MS 3050I	BS PREP		MTM1	02/10/14	0900	1365350			
SW846 3050B	SW846 3050B	Prep for 6010C		MTM1	02/10/14	0900	1365352			
SW846 7471B Prep		Mercury Prep Soil		AXS5	02/10/14	1653	1365636			

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## Appendix 4

**Laboratory Narrative and Chain-of-Custody Documentation** 

#### Metals Fractional Narrative WC-HANFORD, INC. (WCHN) SDG XP0049

#### Sample Analysis

Sample ID	Client ID
342714001	J1T973
342714002	J1T974
342714003	J1T975
342714004	J1T976
342714005	J1T977
342714006	J1T978
342714007	J1T979
1203032507	Method Blank (MB) ICP
1203032508	Laboratory Control Sample (LCS)
1203032511	342714001(J1T973L) Serial Dilution (SD)
1203032509	342714001(J1T973D) Sample Duplicate (DUP)
1203032510	342714001(J1T973S) Matrix Spike (MS)
1203035887	342714001(J1T973PS) Post Spike (PS)
1203032502	Method Blank (MB) ICP-MS
1203032503	Laboratory Control Sample (LCS)
1203032506	342714001(J1T973L) Serial Dilution (SD)
1203032504	342714001(J1T973D) Sample Duplicate (DUP)
1203032505	342714001(J1T973S) Matrix Spike (MS)
1203033173	Method Blank (MB) CVAA
1203033174	Laboratory Control Sample (LCS)
1203033183	342714001(J1T973L) Serial Dilution (SD)
1203033181	342714001(J1T973D) Sample Duplicate (DUP)
1203033182	342714001(J1T973S) Matrix Spike (MS)
1203033193	342714001(J1T973PS) Post Spike (PS)

The samples in this SDG were analyzed on a "dry weight" basis.

#### Method/Analysis Information

**Analytical Batch:** 1365353, 1365351 and 1365640

**Prep Batch:** 1365352, 1365350 and 1365636

Standard Operating GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014

**Procedures:** REV# 25 and GL-MA-E-010 REV# 27

**Analytical Method:** SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B

**Prep Method:** SW846 3050B and SW846 7471B Prep

#### Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

#### **System Configuration**

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 6100E inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/-7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

#### Calibration Information

#### **Instrument Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

#### **CRDL** Requirements

The CRDL standard recoveries met the advisory control limits except for potassium and lead. Lead recovered high in the PQL standards analyzed in file 021214A-3 at 12:53 and 14:47; however the concentration in the bracketed sample was greater than two times the PQL.

Potassium recovered high the PQL standards analyzed in files 021314-1 at 08:52 and 021414-2 at 11:18; however the client sample concentrations were greater than two times the PQL.

#### ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

#### Continuing Calibration Blank (CCB) Requirements

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

#### **Continuing Calibration Verification (CCV) Requirements**

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

#### **Quality Control (QC) Information**

#### Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

#### Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 342714001 (J1T973)-ICP, ICP-MS and CVAA.

#### Matrix Spike (MS) Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS did not meet all the recommended quality control acceptance criteria for percent recoveries for the applicable analytes. The silicon recovery was not within the acceptance limits in sample 1203032510 (J1T973)-ICP. See data exception report (DER ID 1267696) behind the case narrative in this data package.

#### **Duplicate Relative Percent Difference (RPD) Statement**

The relative percent difference (RPD) obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the contract required detection limit (RL), a control of +/-RL is used to evaluate the DUP results. Not all applicable analytes met these requirements. The RPD value for mercury was not within the acceptance limits in sample 1203033181 (J1T973)-CVAA.

#### Post Spike (PS) Recovery Statement

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for silicon and verifies

the presence of matrix interferences. See data exception report (DER ID 1267696) behind the case narrative in this data package.

#### Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D).

#### **Technical Information**

#### **Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

#### Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

#### **Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. Dilutions were required for this SDG in order to minimize suppression due to matrix interferences. Samples 342714001 (J1T973), 342714002 (J1T974), 342714003 (J1T975), 342714004 (J1T976) and 342714006 (J1T978)-ICP were diluted because the titanium concentration exceeded the linear range of the instrument which affected antimony, cobalt, lead, vanadium, and zinc. Antimony was suppressed on sample 342714005 (J1T977)-ICP. Samples in this SDG were diluted the standard two times for solids analyzed on the ICPMS.

#### **Preparation Information**

The samples in this SDG were prepared exactly according to the cited SOP.

#### **Miscellaneous Information**

#### **Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. Data exception reports (DER ID 126666 and 1267696) were generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this SDG.

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

#### Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer:

DER Report No.: 1266666

Revision No.:

			Transfer attracts patients against		
	DATA EX	(CEPTION REPORT			
Mo.Day Yr. 11-FE8-14	Division: Industrial	Quality Criteria: Specifications	Type: Process		
Instrument Type: MERCURY	Test / Method: SW846 7471B	Matrix Type: Solid	Client Code: ALBE, WCHN		
Batch ID: 1365640	Sample Numbers: See Below				
Potentially affected work order(s	)(SDG): 342714(XP0049)				
Application Issues:					
Failed RPD for DUP					
Specification and Requirements		DER Disposition:			
Exception Description:		DER Disposition.			
1. Failed RPD for DUP:		The sample and sample dur	olicate % RPD failed outside the control limits		
QC 1203033181DUP		for mercury due to possible sample non-homogeneity and/or matrix interference. The post spike passed the required control limits for Mercury the tension of the absence of a matrix interference. Per GEL's accredite methods and SOPs, a corrective action is not required and the data is qualified and reported.			
,					
		A Section 1			
		F			
i					

Originator's Name:

Nik-Cole Elmore

11-FEB-14

Data Validator/Group Leader:

Bryan Davis

11-FEB-14

DER Report No.: 1267696

Revision No.:

	garas independent independent independent independent interpendent interpendent interpendent interpendent inter		
	DATA EX	CEPTION REPORT	
Mo.Day Yr. 14-FEB-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type:	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1365353	Sample Numbers: See Below		
Potentially affected work order(s)	(SDG): 342714(XP0049)		
Application issues:			
Failed Recovery for MS/PS			
Specification and Requirements Exception Description:		DER Disposition:	
1. Failed Recovery for MS/PS:		silicon. The post spike failed	y failed outside of the control limits for d outside the required control limits for silicon lytes. This verifies the presence of a matrix
QC 1203032510MS,120303	5887PS	interference for silicon and all the other analytes. Per G	verifies the absence of a matrix interference for 3EL's accredited methods and SOPs, a sired and the data is qualified and reported.
		Sample #342714001 is a	finely grated granular solid.
		,	

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Originator's Name:

14-FEB-14

Helen Camello

Data Validator/Group Leader:

14-FEB-14

Jerry Wigfall

	Compa						S REQU	-01	1000	and the second second second	4	
	load	ny Contact n Kessner		ephone No. 5-4688			Project Coordin KESSNER,		Price Code	8B	Deta Tu	rmaround
ining Waste Sites	Sampli	ng Location 382 Subsites		<u></u>			SAF No. RC-232		7D	44		
2-016		_			22000				- fed	٤٧		
n	Offsite	Property No. A	3/0	49			Bill of Lading/A	ir Bill No.	er 05	PC		
		Preservation -	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C					
		Type of Container	G/P	aG	aG	æG	eG					
ARDS/REMARKS		No. of Container(s)	1	1	1	-1	1					
		Volume	125mL	125mL	126mL	250mL	125mL					
		Sample Analysis	See item (1) if Special Instructions	Range -	PAHs - 8310	8081; Chio Herbicides	PC8s - 6082					
Matrix	Sample Date	Sample Time	NAME OF	1000	1125		a person	1000		Half Street		e Walter
SOIL	2.4.14	0820	×	x	X	X	X					
SOIL	2.4.14	0850	x	X	X	X	X					
SOIL	2.4.14	0920	x	x	×	X	x	***************************************				
SOIL	2-4-14	0940	X	X	X	x	メ					
SOIL	5 - 4 - 14	1000	X	X	×	X	×					
Date/Time  2-4-14  Dete/Time  1535  A Date/Time  1535  A Date/Time  1034  Date/Time  0257   04  Date/Time	Received By/Store Received By/Store Received By/Store Received By/Store Received By/Store Received By/Store	Detertine  2-4-14  Detertine  2-5-14  Detertine  Ex  Detertine  Detertine  Detertine	7531 4 2-4-11 100-6	0 35	) ICP Metais - 60 akcium, Chromlu elenium, Sillicon,	010TR (Clo m, Cobait, Silver, Soc	se-out List) (Alur Copper, Iron, Lea dium, Vanadium,	d, Magnes	sium, Manganes	e, Malybdenu	M, Nickel, Pol	assum.
	SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL	ARDS/REMARKS  Storage  Matrix Sample Date  SOIL 2.4.14  S	Offsite Property No.  Preservation Type of Container  ARDS/REMARKS  No. of Container(s)  Volume  Storage  Sample Analysis  Volume  Soil  2.4.14  Soil  2.4.14  Soil  2.4.14  Soil  2.4.14  Soil  2.4.14  Soil  3.4.14  Soil  3.4.1	EL-1866-01  Offsite Property No.	EL-1666-01 060382  Offsite Property No. A 1 3 1 0 4 9  Preservation Type of Container GP as GARDS/REMARKS  No. of Container GP as Sample Analysis Special instructions  Watrix Sample Date Sample Time Soul 2-4-14 0820 X X SOIL 2-4-14 0820 X X X X SOIL 2-4-14 0820 X X X X X X X X X X X X X X X X X X X	Describe Property No. A 1 3 1 0 4 9  Preservation Cool 4C Cool 4C Cool 4C Type of Container GP as as as GP ARDS/REMARKS  No. of Container(s) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	EL-1866-01  Offsite Property No.  A / 3 / 0 4 9  Preservation  Type of Container  Cool 4C  Race Race Cool 4C  Cool 4C  Race Cool 4C	EL-1666-01  Offsite Property No.  A 3 0 4 9  Bill of Lading/A  Preservation  Cool 4C  Cool 4C	EL-1666-01  Offsite Property No. A 3 0 49  Preservation  Type of Container  OP aG aG aG aG aG  ARDS/REMARKS  No. of Container(s) 1 1 1 1 1  Volume 125mL 125	Control   Cont	Commercial Carrier   Fed Example   Control   Control	Contract   Contract

FITETC

Washington	Closure Hant	ord CH	AIN OF CUST	ODY/S	AMPL	EANA	LYS	S REQU	EST	RC-2	32-075	Page :	2 of 2
Collector Company Contact Telep				phone No. -4688		Project Coordinator KESSNER, JH			Price Code		Data Turnaround		
Project Designation Sampling Location 100-IU-2 & 100-IU-6 Remaining Waste Sites 600-382 Subsites						SAF No. RC-232						70	lay
	-12-014	Field La	ogbook No. 1666-01		COA 0603822	1000		Method of Ships Commerica		- fee	1 EX		
Shipped To GEL Laboratories Charls	ton	Offsite	Property No. A 13/	049	)			Bill of Lading/A	ir Bill No.	ee os			
Other Labs Shipped To			Preservation	Cool 4C	Cool 4C	Coal 4C	Cool 40	Cool 4C					
			Type of Container	G/P	#G	ąG	aG	₩G					
POSSIBLE SAMPLE HA	ZARDS/REMARKS		No. of Container(s)	1	1	1	1	1					
None			Volume	125mL	125mL	125mL	250mL	125mL					
Special Handling and/or cool 4c 346	Special Handling and/or Storage  cool 4c  343714  Sample Analy				TPH-Diesel Range - WTPH-D +	PAHs - 8310	Pesticide 8061; Chic Herbicide EPA815	PCBs - 8082					
Sample No.	Matrix	Sample Date	Sample Time	海外的	學系統	2 20 5		\$100 CES		a HELLING	188386		Sales State
- J1T978	SOIL	2.4.14	0820	×	X	X	×	×					
J1T979	SOIL	2.4.14	0812	×				$\pm$	- 2-1	Hyan	113		
Relinquished By/Removed From  Relinquished By/Removed From  Relinquished By/Removed From	Deta/Time  2-4-14/  Deta/Time  2-4-14/  Data/Time  193-6  14 Deta/Time  2-5-/4  Deta/Time  207/4 0400  Data/Time	Received By/Store Received By/Store Received By/Store Received By/Store	B. Fabrica  To J. J. Pater Time  Aliny Control  Aliny Deter Time  Aliny Deter Time  Aliny Deter Time  Control  Aliny Deter Time  Aliny Deter Time	2-47 1025 10171 10190	Cake Solic	ium, Chromius	010TR (Clo	sse-out List) (Alur Copper, Iron, Les flum, Vanadium,	id, Magnes	ium, Manganes	e, Molybdenu	llum, Boron, C m, Nickel, Pol Leyna ()	Cadmium, tassium,
FINAL SAMPLE DISPOSITION  WCH-FE-011	thod	Dispos	ed By Date/T	BU- <b>6</b>		XPOC	49						

# Appendix 5 Data Validation Supporting Documentation

PROJECT: 600-392 DATA PACKAGE: POUY?  VALIDATOR: ELR LAB: CL DATE: 4/3 14  SDG: POUY?  SDG: POUY?  ANALYSES PERFORMED  SW-846/ICP SW-846/GFAA SW-846/Hg SW-846  Cyanide  SAMPLES/MATRIX  JIT973 JIT974 J(T975 J(T976)  J(T977) JIT974 J(T977)  I. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  Standards traceable? Yes  Standards traceable? Yes	Е
SW-846/ICP SW-846/GFAA SW-846/Hg SW-846 SW-846/ICP SW-846/GFAA SW-846/Hg SW-846 Cyanide  SAMPLES/MATRIX  JIT97 JIT97 JIT97 JIT97  I. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present?  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E) Initial calibrations acceptable?  Yes ICP interference checks acceptable?  Yes ICV and CCV checks performed on all instruments?  Yes Standards traceable?  Yes Standards traceable?  Yes	
ANALYSES PERFORMED  SW-846/ICP SW-846/GFAA SW-846/Hg SW-846 Cyanide  SAMPLES/MATRIX  JIT973 JIT574 JIT575 JIT576  JIT977 JIT577 JIT577 JIT577  I. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E) Initial calibrations performed on all instruments? Yes Initial calibrations acceptable? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	2
ANALYSES PERFORMED  SW-846/ICP SW-846/GFAA SW-846/Hg SW-846 Cyanide  SAMPLES/MATRIX  JIT973 JIT574 JIT575 JIT576  JIT977 JIT577 JIT577 JIT577  I. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E) Initial calibrations performed on all instruments? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	
SAMPLES/MATRIX  JIT973 JIT574 JIT575 JIT576  JIT973 JIT574 JIT575  INT979 JIT579  1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	
JIT973 JIT974 JIT975  JIT977 JIT978 JIT979  1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	
JIT973 JIT974 JIT975  JIT977 JIT978 JIT977  I. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	
INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E) Initial calibrations performed on all instruments? Yes  Instruments: Yes  Yes  Yes  Yes  Yes  Yes  Yes  Yes	
INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E) Initial calibrations performed on all instruments? Yes  Instruments: Yes  Yes  Yes  Yes  Yes  Yes  Yes  Yes	
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE  Technical verification documentation present? Yes  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)  Initial calibrations performed on all instruments? Yes  Initial calibrations acceptable? Yes  ICP interference checks acceptable? Yes  ICV and CCV checks performed on all instruments? Yes  ICV and CCV checks acceptable? Yes  Standards traceable? Yes	1
Technical verification documentation present?  Comments:  2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E) Initial calibrations performed on all instruments?  Yes Initial calibrations acceptable?  Yes ICP interference checks acceptable?  Yes ICV and CCV checks performed on all instruments?  Yes ICV and CCV checks acceptable?  Yes Standards traceable?  Yes	L
Initial calibrations performed on all instruments? Yes Initial calibrations acceptable? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	No N/A
Initial calibrations performed on all instruments? Yes Initial calibrations acceptable? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	
Initial calibrations performed on all instruments? Yes Initial calibrations acceptable? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	
Initial calibrations performed on all instruments? Yes Initial calibrations acceptable? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	$\sim$
Initial calibrations acceptable? Yes ICP interference checks acceptable? Yes ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	No N/A
ICV and CCV checks performed on all instruments? Yes ICV and CCV checks acceptable? Yes Standards traceable? Yes	i
ICV and CCV checks acceptable? Yes Standards traceable? Yes	No N/A
ICV and CCV checks acceptable? Yes Standards traceable? Yes	- 1
	- 1
	No N/A
Standards expired?Yes	No N/A
Calculation check acceptable?Yes	No N/A
Comments:	

3. BLANKS (Levels B, C, D, and E)	
ICB and CCB checks performed for all applicable analyses? (Levels D, E)	Yes No
ICB and CCB results acceptable? (Levels D, E)	
Laboratory blanks analyzed?	Yes No N/A
Laboratory blank results acceptable?	
Field blanks analyzed? (Levels C, D, E)	Yes No N/A
Field blank results acceptable? (Levels C, D, E)	Yes No N/A
Transcription/calculation errors? (Levels D, E)	\ \ \ \ \
Comments: $2140 - 79 - 05$	
FD - 10 detects	
4. ACCURACY (Levels C, D, and E)	
MS/MSD samples analyzed?	
MS/MSD results acceptable?	\ // \
MS/MSD standards NIST traceable? (Levels D, E)	Yes No (N/A
MS/MSD standards expired? (Levels D, E)	Yes No N/A
LCS/BSS samples analyzed?	
LCS/BSS results acceptable?	(Yes) No N/A
Standards traceable? (Levels D, E)	Yes No N/A
Standards expired? (Levels D, E)	Yes No N/A
Transcription/calculation errors? (Levels D, E)	Yes No N/A
Performance audit sample(s) analyzed?	Yes (No) N/A
Performance audit sample results acceptable?	Yes No NyA
Performance audit sample results acceptable?  Comments: $MS - SIIICM (090) - )MI$	
$\mathcal{A}$	o PAS

5. PRECISION (Levels C, D, and E)		
Duplicate RPD values acceptable?	بر)	es No 1
Duplicate results acceptable?	(Y	eg No 1
MS/MSD standards NIST traceable? (Levels D, E)	Y	es No
MS/MSD standards expired? (Levels D, E)	Y	es No
Field duplicate RPD values acceptable?	Ү	es (No)
Field split RPD values acceptable?	Ү	es No
Transcription/calculation errors? (Levels D, E)	Y	es No
Comments:		······································
1- Silica 35,8%		
- 51/11 35.8 %		
258)		
1 - 51/11 35,8 %		
6. ICP QUALITY CONTROL (Levels D and E)	Y	res No fi
6. ICP QUALITY CONTROL (Levels D and E) ICP serial dilution samples analyzed?	Y	es No l
6. ICP QUALITY CONTROL (Levels D and E) ICP serial dilution samples analyzed? ICP serial dilution %D values acceptable?	Y	es No l
6. ICP QUALITY CONTROL (Levels D and E) ICP serial dilution samples analyzed? ICP serial dilution %D values acceptable? ICP post digestion spike required?		Yes No 11 Yes No 11 Yes No 11
6. ICP QUALITY CONTROL (Levels D and E)  ICP serial dilution samples analyzed?  ICP serial dilution %D values acceptable?  ICP post digestion spike required?  ICP post digestion spike values acceptable?		Ves No 1 Ves No 1 Ves No 1 Ves No 1
6. JCP QUALITY CONTROL (Levels D and E)  ICP serial dilution samples analyzed?  ICP serial dilution %D values acceptable?  ICP post digestion spike required?  ICP post digestion spike values acceptable?  Standards traceable?		Yes No 1 Yes No 1 Yes No 1 Yes No 1
6. ICP QUALITY CONTROL (Levels D and E) ICP serial dilution samples analyzed? ICP serial dilution %D values acceptable? ICP post digestion spike required? ICP post digestion spike values acceptable? Standards traceable? Standards expired?		Yes No 1 Yes No 1 Yes No 1 Yes No 1
6. JCP QUALITY CONTROL (Levels D and E)  ICP serial dilution samples analyzed?  ICP serial dilution %D values acceptable?  ICP post digestion spike required?  ICP post digestion spike values acceptable?  Standards traceable?  Standards expired?  Transcription/calculation errors?		Yes No 1 Yes No 1 Yes No 1 Yes No 1
6. JCP QUALITY CONTROL (Levels D and E)  ICP serial dilution samples analyzed?  ICP serial dilution %D values acceptable?  ICP post digestion spike required?  ICP post digestion spike values acceptable?  Standards traceable?  Standards expired?  Transcription/calculation errors?  Comments:		Yes No II

7.	FURNACE AA QUALITY CONTROL (Levels D and E)			
Duplica	ate injections performed as required?	Yes	No	N/A
Duplica	ate injection %RSD values acceptable?	Yes	No	N/A
Analyti	ical spikes performed as required?	Yes	No	N/A
Analyti	ical spike recoveries acceptable?	Yes	No	N/A
Standar	rds traceable?	Yes	No	N/A
Standar	rds expired?	Yes	Nq	N/A
MSA p	erformed as required?	Yes	No	N/A
MSA r	esults acceptable?	Yes	No	N/A
Transci	ription/calculation errors?	Yes	Nd	N/A
Commo	ents:			$\bigcup$
8.	HOLDING TIMES (all levels)	$\wedge$		
Sample	es properly preserved?	/Yes	No	N/A
	e holding times acceptable?			
Comm	ents:			
<del></del>				

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)	
Results reported for all requested analyses?	(Yes )No N/A
Results supported in the raw data? (Levels D, E)	Yes No NA
Samples properly prepared? (Levels D, E)	Yes No N/A
Detection limits meet RDL?	
Detection limits meet RDL?  Transcription/calculation errors? (Levels D, E).	Yes No N/A
Comments:	

# Appendix 6

Additional Documentation Requested by Client

#### **GEL LABORATORIES LLC**

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

Report Date: February 18, 2014

Page 1 of 8

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder: 342714

Project Description: RC-232 Soil

Workorder:	342714		Client SDG:	XP0049	Project Description: RC-232 Soil									
Parmname			NOM	<u> </u>	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time	
Metals Analysis - I Batch I	CPMS 365351	-			e angunes a approxima no		and the second s	ererer rassaularier – als c <del>arlet e</del>	-according to consider the management		elena mandelena en rama en reconstrucción de la construcción de la con			
QC120303250 Selenium	4 342714001	DUP		DU	0:327	DU	0.310	mg/kg	N/A ^			SKJ	02/12/14 03:33	
QC120303250 Selenium	3 LCS		4.85			D	4.64	mg/kg		95.7	(80%-120%)		02/12/14 03:10	
QC120303250 Selenium	2 МВ					DU	0.319	mg/kg					02/12/14 03:04	
QC120303250 Selenium	5 342714001	MS	4.96	DU	0.327	D	4.58	mg/kg		92.4	(75%-125%)	)	02/12/14 03:39	
QC120303250 Selenium	6 342714001	SDIL	.T	DU .	-0.554	DU	1.64	ug/L	N/A		(0%-10%)	ı	02/12/14 03:51	
Metals Analysis-Io	CP 365353			**************************************			<u> </u>						A ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4	
QC120303250 Aluminum	9 342714001	DUP			7160		6880	mg/kg	3.96		(0%-20%)	HSC	02/12/14 14:12	
Antimony				DU	1.43	DU	1.61	mg/kg	N/A ^				02/14/14 10:37	
Arsenic				В	1.63	В	2.26	mg/kg	32.9 ^		(+/-2.93	)	02/12/14 14:12	
Barium					78.4		74.2	mg/kg	5.54		(0%-20%)	)		
Beryllium					0.694		0.695	mg/kg	0.159 ^	`	(+/-0.489	)		
Boron				U	0.866	U	0.978	mg/kg	N/A ^					
Cadmium				В	0.113	В	0.101	mg/kg	11.4 ^	`	(+/-0.489)	)		
Calcium					2800		2710	mg/kg	3.53		(0%-20%)	•		
Chromium					11.5		11.5	mg/kg	0.494		(0%-20%)	•		
Cobalt				D	8.90	D	8.13	mg/kg	9.00 ^	<b>\</b>	(+/-2.44	)	02/14/14 10:37	
Copper					11.9		12.3	mg/kg	3.55		(0%-20%)	•	02/12/14 14:12	
Iron					21500		21200	mg/kg	1.66		(0%-20%)	•		

#### **QC Summary**

Workorder: 342714	CU CD.C. VD0046		VC 5	ummai Proi		otion: RC-2	22 6		
	Client SDG: XP0049		O						Page 2 of 8
Parmname Metals Analysis-ICP	NOM	Sample	Quai	QC_	Units	RPD/D%	REC%	Range Anlst	Date Time
Batch 1365353									
Lead	BD	4.11	D	5.30	mg/kg	25.2 ^		(+/-4.89) HSC	02/14/14 10:37
Magnesium		3920		4020	mg/kg	2.54		(0%-20%)	02/12/14 14:12
Manganese		359		326	mg/kg	9.63		(0%-20%)	
Molybdenum	В	0.248	В	0.256	mg/kg	3.13 ^		(+/-0.978)	
Nickel		11.3		12.7	mg/kg	12.3		(0%-20%)	
Potassium		1420		1350	mg/kg	5.07		(0%-20%)	02/13/14 09:28
Silicon	N	931		1010	mg/kg	8.14		(0%-20%)	02/12/14 14:12
Silver	U	0.0866	U	0.0978	mg/kg	N/A ^			02/13/14 09:28
Sodium		108		102	mg/kg	5.55 ^		(+/-24.4)	
Vanadium	D	57.9	D	56.3	mg/kg	2.91		(0%-20%)	02/14/14 10:37
Zinc	D	39.8	D	37.7	mg/kg	5.40		(0%-20%)	
QC1203032508 LCS Aluminum	474			495	mg/kg		104	(80%-120%)	02/12/14 14:06
Antimony	47.4			47.8	mg/kg		101	(80%-120%)	02/14/14 10:28
Arsenic	47.4			48.4	mg/kg		102	(80%-120%)	02/12/14 14:06
Barium	47.4			49.8	mg/kg		105	(80%-120%)	
Beryllium	47.4			50.7	mg/kg		107	(80%-120%)	
Boron	47.4			49.0	mg/kg		103	(80%-120%)	
Cadmium	47.4			50.2	mg/kg		106	(80%-120%)	
Calcium	474			503	mg/kg		106	(80%-120%)	
Chromium	47.4			48.2	mg/kg		102	(80%-120%)	
Cobalt	47.4			49.8	mg/kg		105	(80%-120%)	02/14/14 10:28

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## **QC Summary**

Workorder: 342714	Client SDG: XP00	)49		Proj		otion: RC-2	32 Soil			Page 3 of 8	
Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range A	nist	Date Time	
Metals Analysis-ICP Batch 1365353											
Copper	47.4			51.0	mg/kg		107	(80%-120%)	HSC	02/12/14 14:06	
Iron	474			505	mg/kg		106	(80%-120%)			
Lead	47.4			50.3	mg/kg		106	(80%-120%)		02/14/14 10:28	
Magnesium	474			511	mg/kg		108	(80%-120%)		02/12/14 14:06	
Manganese	47.4			49.6	mg/kg		105	(80%-120%)			
Molybdenum	47.4			48.1	mg/kg		101	(80%-120%)			
Nickel	47.4			50.2	mg/kg		106	(80%-120%)			
Potassium	474			502	mg/kg		106	(80%-120%)		02/13/14 09:22	
Silicon	474			444	mg/kg		93.5	(80%-120%)		02/12/14 14:06	
Silver	47.4			50.0	mg/kg		105	(80%-120%)		02/13/14 09:22	
Sodium	474			486	mg/kg		103	(80%-120%)			
Vanadium	47.4			49.1	mg/kg		103	(80%-120%)		02/14/14 10:28	
Zinc	47.4			48.9	mg/kg		103	(80%-120%)			
QC1203032507 MB Aluminum			U	6.44	mg/kg					02/12/14 14:03	
Antimony			В	-0.412	mg/kg					02/14/14 10:24	
Arsenic			U	0.473	mg/kg					02/12/14 14:03	
Barium			U	0.0947	mg/kg						
Beryllium			U	0.0947	mg/kg						
Boron			U	0.947	mg/kg						
Cadmium			U	0.0947	mg/kg						
Calcium			U	7.58	mg/kg						

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## **QC Summary**

Workorder: 342714	Client SDG:	XP0049		C Suii			otion: RC-2	32 Soil		Page 4 of 8
Parmname	NOM	S	ample (	Qual	QC	Units	RPD/D%	REC%	Range Anist	Date Time
Metals Analysis-ICP Batch 1365353										
Chromium				U	0.142	mg/kg			HSC	02/12/14 14:03
Cobalt				U	0.142	mg/kg				02/14/14 10:24
Copper				U	0.284	mg/kg				02/12/14 14:03
Iron				U	7.58	mg/kg				
Lead				U	0.313	mg/kg				02/14/14 10:24
Magnesium				U	8.05	mg/kg				02/12/14 14:03
Manganese				U	0.189	mg/kg				
Molybdenum				U	0.189	mg/kg				
Nickel				U	0.142	mg/kg				
Potassium				U	6.06	mg/kg				02/13/14 09:19
Silicon				U	1.42	mg/kg				02/12/14 14:03
Silver				U (	0.0947	mg/kg				02/13/14 09:19
Sodium				В	-15.6	mg/kg				
Vanadium				U (	0.0947	mg/kg				02/14/14 10:24
Zinc				В	0.692	mg/kg				
QC1203032510 342714001 M8 Aluminum	492		7160		9050	mg/kg		N/A	(75%-125%)	02/12/14 14:15
Antimony	49.2	DU	1.43	D	47.2	mg/kg		96	(75%-125%)	02/14/14 10:40
Arsenic	49.2	В	1.63		51.5	mg/kg		101	(75%-125%)	02/12/14 14:15
Barium	49.2		78.4		127	mg/kg		99.1	(75%-125%)	
Beryllium	49.2		0.694		51.1	mg/kg		102	(75%-125%)	
Boron	49.2	U	0.866		48.5	mg/kg		97.7	(75%-125%)	

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## **QC Summary**

Workorder: 342714	Client SDG: XP	0049		Proj		ption: RC-2	32 Soil			Page 5 of 8
Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Batch 1365353										
Cadmium	49.2	3 0.113	}	49.6	mg/kg		101	(75%-125%)	HSC	02/12/14 14:15
Calcium	492	2800	)	3520	mg/kg		N/A	(75%-125%)	ı	
Chromium	49.2	11.5		59.7	mg/kg		98.1	(75%-125%)		
Cobalt	49.2	8.90	D	62.5	mg/kg		109	(75%-125%)		02/14/14 10:40
Copper	49.2	11.9	•	65.3	mg/kg		109	(75%-125%)		02/12/14 14:15
Iron	492	21500	)	22400	mg/kg		N/A	(75%-125%)	ı	
Lead	49.2 Bl	D 4.11	D	55.5	mg/kg		104	(75%-125%)	ı	02/14/14 10:40
Magnesium	492	3920	)	4550	mg/kg		N/A	(75%-125%)		02/12/14 14:15
Manganese	49.2	359	<b>)</b>	370	mg/kg		N/A	(75%-125%)		
Molybdenum	49.2	В 0.248	3	48.6	mg/kg		98.4	(75%-125%)		
Nickel	49.2	11.3	3	60.2	mg/kg		99.6	(75%-125%)		
Potassium	492	1420	)	1960	mg/kg		110	(75%-125%)		02/13/14 09:31
Silicon	492	N 931	I N	739	mg/kg		0*	(75%-125%)		02/12/14 14:15
Silver	49.2	U 0.0866	5	50.4	mg/kg		102	(75%-125%)		02/13/14 09:31
Sødium	492	108	3	637	mg/kg		108	(75%-125%)		
Vanadium .	49.2	D 57.9	D D	110	mg/kg		107	(75%-125%)		02/14/14 10:40
Zinc	49.2	D 39.8	B D	93.2	mg/kg		109	(75%-125%)		
QC1203035887 342714001 PS Silicon	5000	N 10700	)	23100	ug/L		246*	(80%-120%)		02/14/14 10:31
QC1203032511 342714001 SDII Aluminum	LT .	82600	) D	16900	ug/L	2.4		(0%-10%)		02/12/14 14:18
Antimony	Di	J -5.61	DU	7.15	ug/L	N/A		(0%-10%)		02/14/14 10:43
Arsenic		В 18.8	B DU	2.17	ug/L	N/A		(0%-10%)		02/12/14 14:18

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**QC Summary** 

armname  letals Analysis-ICl atch 13  Barium  Beryllium  Boron  Cadmium	P 365353	NOM	Sample	Ougl	~~				
atch 13 Barium Beryllium Boron				Quai	QC	Units	RPD/D%	REC% Range Anlst	Date Time
Beryllium Boron		•							
Boron			905	D	184	ug/L	1.75	(0%-10%) HSC	02/12/14 14:1
			8.01	D	1.69	ug/L	5.32	(0%-10%)	
admium		U	4.99	DU	4.33	ug/L	N/A	(0%-10%)	
		В	1.30	DU	0.433	ug/L	N/A	(0%-10%)	
Calcium			32400	D	6640	ug/L	2.56	(0%-10%)	
Chromium			132	D	28.0	ug/L	5.86	(0%-10%)	
Cobalt		D	20.5	D	3.78	ug/L	8	(0%-10%)	02/14/14 10:4
Copper			137	D	27.0	ug/L	1.38	(0%-10%)	02/12/14 14:1
ron			248000	D	51400	ug/L	3.33	(0%-10%)	
ead		ВС	9,49	D	3.60	ug/L	89.4	(0%-10%)	02/14/14 10:4
Magnesium			45200	D	9380	ug/L	3.73	(0%-10%)	02/12/14 14:1
Manganese			4150	D	862	ug/L	4.01	(0%-10%)	
Molybdenum		. В	3 2.86	DU	0.866	ug/L	N/A	(0%-10%)	
Nickel			130	D	26.3	ug/L	1.2	(0%-10%)	
Potassium			16400	D	3370	ug/L	2.87	(0%-10%)	02/13/14 09:3
Silicon		N	i 10700	D	2190	ug/L	2.08	(0%-10%)	02/12/14 14:1
Silver		ι	-3.99	DU	0.433	ug/L	N/A	(0%-10%)	02/13/14 09:3
Sodium			1250	D	315	ug/L	26.5	(0%-10%)	
Vanadium	,	Γ	) 134	D	26.7	ug/L	.146	(0%-10%)	02/14/14 10:4
Zinc		Ε	91.9	D	18.5	ug/L	.384	(0%-10%)	
Aetals Analysis-Mo	(aroury								

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#### **GEL LABORATORIES LLC**

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

### **QC Summary**

Workorder:	342714		Client SDG:	XP0049	, -		Proj	ect Descrip	ption: RC-2	32 Soil			Page	e 7 of 8
Parmname			NOM	1	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-N Batch	<b>Mercury</b> 1365640													
QC120303318 Mercury	342714001	DUP		*U	0.00398	*	0.0272	mg/kg	208*^		(+/-0.0117)	NOR1	02/11/1	4 10:05
QC120303311 Mercury	74 LCS		0.120				0.118	mg/kg		98.2	(80%-120%)		02/11/1	14 09:54
QC120303317 Mercury	73 MB					U	0.00387	mg/kg					02/11/1	4 09:52
QC120303318 Mercury	342714001	MS	0.117	*U	0.00398		0.119	mg/kg		102	(80%-120%)		02/11/1	4 10:07
QC120303319 Mercury	93 342714001	PS	2.00	*U	-0.009		1.96	ug/L		98.2	(80%-120%)		02/11/1	14 10:14
QC120303313 Mercury	83 342714001	SDIL	r ·	*U	-0.009	DU	0.0199	ug/L	N/A		(0%-10%)		02/11/1	14 10:12

#### Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Date:

14 April 2014

To:

Washington Closure Hanford Inc. (technical representative)

From:

**ELR Consulting** 

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites -- Soil Full Protocol - Waste Site

600-382

Subject:

Diesel Range Organics - Data Package No. XP0049-GEL

#### INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0049 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1T973	2/4/14	Soil	С	See note 1
J1T974	2/4/14	Soil	С	See note 1
J1T975	2/4/14	Soil	С	See note 1
J1T976	2/4/14	Soil	С	See note 1
J1T977	2/4/14	Soil	С	See note 1
J1T978	2/4/14	Soil	С	See note 1

^{1 -} Diesel range organics by NWTPH-d.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Data Requested by Client

#### DATA QUALITY OBJECTIVES

#### **Holding Times**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Analytes must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-

detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

#### Method Blanks

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

#### Field (equipment) Blanks

No field blanks were submitted for analysis.

#### Accuracy

#### Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

#### Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

Due to the surrogate being diluted out, all diesel range organic and motor oil results in samples J1T973 and J1T978 were qualified as estimates and flagged "J".

All other surrogate results were acceptable.

#### Precision

#### Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All duplicate results were acceptable.

#### Field Duplicate Samples

One set of field duplicates (J1T973/J1T978) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. The RPD for diesel range organics (43.6%) was outside QC limits. Under the WCH statement of work, no qualification is required. All other field duplicate results were acceptable.

#### Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

#### Completeness

Data package No. XP0049 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

#### **MAJOR DEFICIENCIES**

None found.

#### MINOR DEFICIENCIES

The following minor deficiencies were noted:

 Due to the surrogate being diluted out, all diesel range organic and motor oil results in samples J1T973 and J1T978 were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

#### **REFERENCES**

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

# Appendix 1 Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The
  data may not be valid for some specific applications (i.e., usable for decisionmaking purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

# DIESEL RANGE ORGANICS DATA QUALIFICATION SUMMARY*

SDG: XP0049	REVIEWER: ELR	Project: 600-382	PAGE_1_OF_1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Diesel range organics Motor oil	J	J1T973, J1T978	Surrogate recovery

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

# Appendix 3 Annotated Laboratory Reports

#### **GEL LABORATORIES LLC**

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

SW 3541/NWTPH-Dx in Soil "Dry Weight

Contact:

Joan Kessner

Client SDG: XP0049

678

0.00*

(50%-150%)

Project:

RC-232 Soil

______

Sample ID:

Client Sample ID: J1T973

342714001

Project: Client ID: WCHN00213 WCHN001

Matrix:

342/14 SOIL

Collect Date:

04-FEB-14 08:20

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

1.85%

Corrected*

4113/14

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst Da	ate Time Batch	Method
Diesel Range Organic	S								
SW 3541/NWTPH-D	x in Soil "Dry 3	Weight Corrected"							
Diesel Range Organics (CI			55100	170000	ug/kg	25	BYT1 02/16	/14 1704 1366736	1
Motor Oil (C20-C36)	D -	1660000	55100	170000	ug/kg	25			
The following Prep M	1ethods were pe	erformed:							
Method	Description		J. J	Analyst	Date	Tim	ne Prep B	atch	
SW846 3541	3541 DRO IN			AXVI	02/14/14	4 1730	1366735		
SW846 3541	3541 DRO IN	SOIL PREP		CXR2	02/12/14	4 1008	8 1366135		
The following Analy	tical Methods v	were performed:							
Method	Description					Analyst Co	omments		
I	NWTPH-Dx i	n Soil							
Surrogate/Tracer Rec	overv Test				Result	Nominal	Recovery?	6 Acceptable I	Limits

0.00 ug/kg

Notes:

o-Terphenyl

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21 Richland, Washington 99354

Contact:

Joan Kessner

Project:

RC-232 Soil

Client Sample ID: J1T974

342714002

Sample ID: Matrix:

SOIL

Collect Date:

04-FEB-14 08:50

Receive Date:

07-FEB-14

Collector: Moisture: Client

14.8%

V4/13	3/14
-------	------

Project:

Client ID:

Client SDG: XP0049

WCHN00213

WCHN001

Parameter	Qualifier	Result	DL	RL	Un	its DF	Anal	yst Date	Time	Batch	Method
Diesel Range Org	anics										
SW 3541/NWTPH	H-Dx in Soil "Dry W	eight Corrected"									
Diesel Range Organics		4060	2540	7820	ug/k	g i	BYTI	02/16/14	1743 13	366736	1
Motor Oil (C20-C36)		53800	2540	7820	ug/k	g 1					
The following Pre	ep Methods were per	formed:									
Method	Description			Analyst	Date	Tin	ne F	rep Bato	:h		
SW846 3541	3541 DRO IN	SOIL PREP		AXVI	02/14/	14 1730	0 1	366735			
SW846 3541	3541 DRO IN	SOIL PREP		CXR2	02/12/	14 100	8 1	366135			
The following Ar	nalytical Methods w	ere performed:									
Method	Description					Analyst Co	ommer	its			
l	NWTPH-Dx in	Soil									
Surrogate/Tracer I	Recovery Test				Result	Nominal	Rec	overy%	Accept	able L	imits
o-Terphenyl	SW 3541 Corrected	/NWTPH-Dx in Soil "Dry Weight			632 ug/kg	782		80.8	(50%	%-150%)	)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Client Sample ID: J1T975

Project: Client ID:

WCHN00213 WCHN001

Sample ID:

342714003

SOIL

Matrix: Collect Date:

04-FEB-14 09:20

Receive Date:

07-FEB-14

Collector:

Client

Moisture:

9.67%

Parameter	Qualifier	Result	DL	RL	Units	5 DF	Analyst Date	Time Batch	Metho
Diesel Range Organic	s								
SW 3541/NWTPH-D Diesel Range Organics (CI Motor Oil (C20-C36)	x in Soil "Dry '	Weight Corrected" 2770 39500	2400 2400	7370 7370			BYT1 02/16/14	1821 1366736	i
The following Prep M	lethods were p	erformed:							
Method	Description	n		Analyst	Date	Time	e Prep Batch	)	
SW846 3541	3541 DRO IN	SOIL PREP		AXVI	02/14/14		1366735		
SW846 3541	3541 DRO IN	I SOIL PREP		CXR2	02/12/14	1008	1366135		
The following Analy	tical Methods v	were performed:							
Method	Description					Analyst Co	mments		
1	NWTPH-Dx								
Surrogate/Tracer Rec	overy Test				Result	Nominal	Recovery%	Acceptable I	
o-Terphenyl		41/NWTPH-Dx in Soil "Dry Weighted"	ht		648 ug/kg	737	87.9	(50%-150%	6)

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# Certificate of Analysis

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Contact:

Richland, Washington 99354 Joan Kessner

Project:

RC-232 Soil

Client Sample ID: J1T976 Sample ID:

342714004

Matrix:

SOIL

Collect Date:

04-FEB-14 09:40

Receive Date:

07-FEB-14 Client

Collector: Moisture:

3.47%

Client SDG: XP0049

Project:

WCHN00213

Client ID:

WCHN001

	Ovalifian	Result	DL	RL	Units	DF .	Analyst	Date	Time Batch	Method
Parameter	Qualifier	Result								
Diesel Range Org	anics									
	I-Dx in Soil "Dry	Weight Corrected"			_	,	nama o	10201	1900 1366736	1
Diesel Range Organic		2240	2240	6900	ug/kg	l -	BYT1 03	2/10/14	1900 1300730	•
Motor Oil (C20-C36)	. (0.0 0.0)	18100	2240	6900	ug/kg	1				
	ep Methods were pe	erformed:								
	Description			Analyst	Date	Time	e Pre	p Batch	1	
Method				AXV1	02/14/14	1730	1366	5735		
SW846 3541		SOIL PREP		CXR2	02/12/14	1008	1360	5135		
SW846 3541	3541 DRO II	N SOIL PREP		CARZ	0201201					
The following A	nalytical Methods	were performed:								
Method	Description					Analyst Co	mments			
Method	NWTPH-Dx									
1	MAA II II-DX	III 3011			Dogult	Nominal	Recov	ervº/o	Acceptable	Limits
Surrogate/Tracer	Recovery Test				Result				(50%-150	
o-Terphenyl	SW 35	41/NWTPH-Dx in Soil "Dry We	eight		576 ug/kg	690	8	3.5	(30%-130	/U j
0- respilonys	Correc									

2040 Savage Road Charleston SC 29407 - (843) 558-8171 - www.gel.com

# **Certificate of Analysis**

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Contact:

Richland, Washington 99354 Joan Kessner

Project:

RC-232 Soil

Project: Client ID:

Client SDG: XP0049

WCHN00213

WCHN001

Client Sample ID: J1T977 Sample ID:

342714005

Matrix:

SOIL

Collect Date:

04-FEB-14 10:00

Receive Date: Collector:

07-FEB-14 Client

Moisture:

2.76%

Parameter	Qualifier	Result	DL	RL	Ur	nits Di	Analy	st Date	Time Batch	Method
Diesel Range Organic	S						·			
SW 3541/NWTPH-Da	k in Soil "Dry V	Weight Corrected"								
Diesel Range Organics (C16 Motor Oil (C20-C36)	0-C20) Ŭ J	2210 5950	2210 2210	6810 6810	-6	•	l BYTI	02/16/14	1939 1366736	1
The following Prep M	lethods were pe	erformed:			_					
Method	Description			Analyst	Date	Ti	ne Pi	rep Batcl		
SW846 3541	3541 DRO IN	SOIL PREP		AXVI	02/14			366735		
SW846 3541	3541 DRO IN	SOIL PREP		CXR2	02/12			866135		
The following Analyt	ical Methods w	vere performed:								
Method	Description					Analyst C	omment	c		
1	NWTPH-Dx ii	ı Soil				Maryst	Onimicati	.3	~	
Surrogate/Tracer Reco	very Test				Result	Nominal	Reco	very%	Acceptable L	imits
o-Terphenyl	SW 354 Correcte	1/NWTPH-Dx in Soil "Dry Weigh	nt		539 ug/kg	681	- 1440	79.1	(50%-150%	-

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis

Report Date: February 18, 2014

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0049

Project:

RC-232 Soil

Project: Client ID: WCHN00213 WCHN001

Sample ID:

Client Sample ID: J1T978

342714006

Matrix:

SOIL

Collect Date: Receive Date: 04-FEB-14 08:20 07-FEB-14

Collector:

Client

Moisture:

1.72%

Parameter	Qualifier	Result	DL	RL	Uni	ts DF	Analy	st Date	Time E	Batch	Metho
Diesel Range Orga	anics										
SW 3541/NWTPF	I-Dx in Soil "Dry \	Weight Corrected"									
Diesel Range Organics	s (C10-C20) DJ 🗅	<b>T</b> 80900 5	4700	168000	ug/k	g 25	BYTI	02/16/14	2018 13	66736	í
Motor Oil (C20-C36)	D 2	<b>5</b> 1270000 5	4700	168000	ug/k	g 25					
The following Pre	p Methods were pe	erformed:									
Method	Description	n		Analyst	Date	Tin	ne P	rep Bato	h		
SW846 3541	3541 DRO IN	SOIL PREP		AXVI	02/14/	14 173	) 13	366735			
SW846 3541	3541 DRO IN	I SOIL PREP		CXR2	02/12/	14 100	B 13	366135			
The following Ar	nalytical Methods v	were performed:									
Method	Description	l				Analyst Co	ommen	ts			
l	NWTPH-Dx	n Soil									
Surrogate/Tracer	Recovery Test				Result	Nominal	Reco	very%	Accept	able L	imits
o-Terphenyl		11/NWTPH-Dx in Soil "Dry Weight ed"			0.00 ug/kg	673		0.00*	(50%	6-150%	)

# Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

#### FID Diesel Range Organics WC-HANFORD, INC. (WCHN) SDG XP0049

#### Method/Analysis Information

Procedure: Analysis of Diesel Range Organics by Flame Ionization Detector

Analytical Method: NWTPH-Dx in Soil

Prep Method: SW846 3541

Analytical Batch Number: 1366736

Prep Batch Number: 1366735

#### Sample Analysis

The following samples were analyzed using the analytical protocol as established in NWTPH-Dx in Soil:

Sample ID	Client ID
342714001	J1T973
342714002	J1T974
342714003	J1T975
342714004	J1T976
342714005	J1T977
342714006	J1T978
1203036054	Method Blank (MB)
1203036055	Laboratory Control Sample (LCS)
1203036058	342714006(J1T978) Matrix Spike (MS)
1203036059	342714006(J1T978) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

## Preparation/Analytical Method Verification

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-003 REV# 24.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

#### **Calibration Information**

#### **Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

#### Continuing Calibration Verification (CCV) Requirements

The associated calibration verification standards (CCV) did not meet the acceptance criteria.

The CCV standard bracketing the samples in this SDG recovered slightly above the acceptance limits for Diesel Range Organics; however, this had no adverse effects on the data as the detection of Diesel Range Organics was below the PQL in all affected samples.

Surrogate recovery did not meet the acceptance criteria in the CCV standard analyzed for this SDG; however, this had no adverse effects on the data as all undiluted samples in this SDG recovered well within the acceptance limits for the surrogate.

Analyte peaks eluted within the established retention time windows for this method.

#### **Quality Control (QC) Information**

#### Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

#### Surrogate Recoveries

Samples 1203036058 (J1T978MS), 1203036059 (J1T978MSD), 342714001 (J1T973) and 342714006 (J1T978) did not meet surrogate recovery acceptance criteria due to dilution.

## Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

#### QC Sample Designation

Sample 342714006 (J1T978) was selected for the matrix spike and matrix spike duplicate analysis.

## Matrix Spike (MS) Recovery Statement

The MS, performed on sample 342714006 (J1T978), did not meet spike recovery acceptance criteria due to dilution, sample matrix interference and high level of target analytes in the parent sample.

#### Matrix Spike Duplicate (MSD) Recovery Statement

The MSD, performed on sample 342714006 (J1T978), did not meet spike recovery acceptance criteria due to dilution, sample matrix interference and high level of target analytes in the parent sample.

## MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD met the acceptance limits.

#### **Technical Information**

#### **Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

## Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Analyte peaks eluted within the established retention time windows for this method.

#### Sample Dilutions

Samples 1203036058 (J1T978MS), 1203036059 (J1T978MSD), 342714001 (J1T973) and 342714006 (J1T978) were diluted due to the presence of over-range target analytes.

#### Sample Re-extraction/Re-analysis

All samples in this SDG were extracted and analyzed twice due to quality issue in the first analysis. The second analysis was reported.

#### Miscellaneous Information

## **Electronic Package Comment**

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

#### Data Exception (DER) Documentation

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. DER #1268157 was generated for this SDG.

#### **Manual Integrations**

Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

#### **Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The additional comments were not required.

#### **System Configuration**

The Diesel Range Organics analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
FID7.I	Agilent Gas Chromatograph	Agilent 6890N GC/FID	DB-5MS	30m x 0.25mm, 0.25um(J&W)

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

**DER Report No.: 1268157** 

Revision No.: 2

## **DATA EXCEPTION REPORT** Type: Process Quality Criteria: Division: Mo.Day Yr. 17-FEB-14 Specifications Federal **Client Code:** Matrix Type: instrument Type: GC/FID Test / Method: WCHN Solid NWTPH-Dx in Soil Sample Numbers: Batch ID: See Below 1366736 Potentially affected work order(s)(SDG): 342554(XP0048),342714(XP0049) Application Issues: Failed Yield for Surrogates Failed Recovery for MSD/PSD DER Disposition: Specification and Requirements **Exception Description:** 1 & 2. Samples were diluted due to over-range target analyte. As a result, the surrogates and/or spiked analytes were diluted out of their acceptance 1. Samples 342714006 and its QC samples 1203036058(MS)/1203036059(MSD) did not meet surrogate recovery limit. The data were reported. acceptance criteria. 2. The failure was due to high level of Motor Oil range organics in the 2. The QC samples 1203036058(MS) and 1203036059(MSD), performed on sample 342714006, did not meet spike recovery acceptance criteria. parent sample. The data were reported. 2. The MSD(1203036057), performed on sample 342554001, recovered motor oil at 65%(SPC Limit: 70%-130%).

Page 35 of 149

Originator's Name:

17-FEB-14

Benjamin Taft

Data Validator/Group Leader:

Jimin Cao

18-FEB-14

Washington C	losure Hanf	ord CH	AIN OF CUST	ODY/S	SAMPL	E ANA	LYSI	S REQL	JEST	RC-2	32-075	Page	1 of 2
Collector JOHNSON, BRADY		Comp	eny Contact an Kessner	Tel	ephone No. 5-4688			Project Coordin	nator	Price Code	88	Data T	urnaround
Project Designation 100-IU-2 & 100-IU-6 Rema	ining Waste Sites	Sampl	ling Location 0-382 Subsites	<u> </u>	<i>y</i>			SAF No. RC-232		7 D	ay	4	
	2-016		ogbook No. -1666-01		COA 0603822	2000		Method of Ship Commerica		- fed	2×3		
Shipped To GEL Laboratories Charlsto	n	Offsite	Property No. A	3/0	49			Bill of Lading/		See 05	OC		
Other Labs Shipped To					T	T					1		1
NA			Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C					
,			Type of Container	G/P	aG	æG	aG	aG				1	
POSSIBLE SAMPLE HAZ	ARDS/REMARKS		No. of Container(s)	1	1	1	1	1					
None			Valume	125mL	125mL	125mL	250mL	125mL					
Special Handling and/or S	Storage 3714		Sample Analysis	See item (1) in Special Instructions	TPH-Dissel Range - WTPH-D +	PAHs - 8310	Pesticides 8081; Chlor Herbicides EPA8151	PC8s - 8082					
Sample No.	Matrix	Sample Date	e Sample Time	<b>第29</b> 页面				# E-9353	933		<b>新疆设置</b>	PACE SE	
∗J1T973	SOIL	2.4.14	0820	×	×	X	X	X					
-J1T974	SOIL	2.4.14	0850	x	X	X	X	· x					
· J1T975	SOIL	2.4.14	0920	x	*	×	×	×					
· J1T976	SOIL	2.4.14	0840	X	X	×	х	8					
-J1 <b>T</b> 977	SOIL	2.4.14	1000	x	X	×	×	×					
CHAIN OF POS			Sign/Print Names		SPEC	IAL INSTRU			<u> </u>				
Relinquished By/Removed From	DeterTime  153 5  14 DeterTime 1035  15 2-5-14  DeterTime 1030  15 2-5-14  DeterTime 025714 09  DeterTime	Received By/Story Reference By/Story	din 2-4-14  Adding Control  Ad	1025 2.7-1 09:1	Caic Seio	ium, Chromiui nium, Silicon,	n, Cobalt, C	Copper, Iron, Lei ium, Vanadium,	d, Magnes	imony, Arsenic, sium, Manganes cury - 7471 - (C\	e, Molybdenu	EVIEWED BY COO VIACE	Cadmium, lassium,
DISPOSITION DISPOSAL Method DISPOSITION		Dispot	ou oy Date/Ti	me									

FITETC

Washington	Closure Han	ford CH	IAIN OF CUST		SAMPL	E ANA	LYS	S REQL	JEST	RC-2	32-076	Page :	2 of 2
Collector JOHNSON, BRADY		Comp	any Contact an Kessner	Tel	ephone No. 5-4688			Project Coordin KESSNER	ator	Price Code		Data T	urnaround
Project Designation 100-IU-2 & 100-IU-6 Ren	naining Waste Sites	Samp	ling Location 0-382 Subsites					SAF No. RC-232		8B		70	day
	-12-019	Field EL	Logbook No. 1666-01		COA 0603822	22000 Method of Shipment Commerical Carrier — Fed EX							
Shipped To GEL Laboratories Charls	ton	Offsit	e Property No. A 13/	1040	7			Bill of Lading/A		er os	PC		
Other Labs Shipped To			Preservation	Cool 4C	Cool 4C	Coal 4C	Cool 40	Cool 4C		2			
			Type of Container	G/P	8G	aG	<b>a</b> G	a-G					
POSSIBLE SAMPLE HA	ZARDS/REMARKS		No. of Container(s)	1	1	1	1	1					
None			Volume	125mL	125mL	125mi.	250mL	125mL					
Special Handling and/or cool 4c 346	Storage		Sample Analysis	See item (1) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	Pesticide 6081; Chic Herbicide EPA815	PCBs - 8082					
Sample No.	Matrix	Sample Date	te Sample Time	46.53	DEFE	1000	· · · · · · · · · · · · · · · · · · ·			P Colored	<b>高原S48</b> 8	To Miles to the	
-J1T978	SOIL	2.4.14	0820	×	X	X	×	×					
J1T979	SOIL	2.4.14	0812	X				+	- 2-1	1+14an	WB		
Relinquished By/Removed From C. B. T. W. J. T. Relinquished By/Removed From Relinquished By/Removed From Relinquished By/Removed From C. Relinquished By/Remov	Data/Time  2-4-14/2  Deste/Time  2-14-15/3-5  /A Data/Time / / / / / / / / / / / / / / / / / / /	Received By/Stor	B. Fahibe edin 2-4-14 gris and in Detertine ed Extending Detertine ed in Parallel Doublet in Detertine ed in Parallel Doublet in Detertine ed	1025 1025 1025	(1) I Casic Scale Scale (1) 3 (1) 4 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1 (1) 1	ium, Chromius	010TR (Clo	ise-out List) (Akur Copper, Iron, Lea fium, Vanadium,	ad, Magnet	sium, Manganes	ie, Molybdeni	likum. Boron, C m., Nickel, Pol LUMAC	Cadmium, asskum,
DISPOSITION  WCH-EE-011	FIXA	Dispo	sed By Date/T	ima		XP00	49						

# Appendix 5 Data Validation Supporting Documentation

VALIDATION LEVEL:	Α	В		D	Е
PROJECT: (	900 <del>-</del> 382		DATA PACKAG	E: XPOC	149
VALIDATOR:	ELR	LAB: C	: (	DATE: 4	13/14
·	<u></u>		SDG:	0049	
		ANALYSES	PERFORMED		
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MAT	RIX:				
11597		774 ()	11975	117976	
11467		578			
<u> </u>	7 013	7 / 1			
					Soil
Technical verification	ACKAGE COMP	present?		VE	Yes No N/A
	MENT TUNING				
Initial calibrations	s acceptable?				Yes No N/A
Continuing calibration	ations acceptable?				Yes No N/A
Standards traceab	le?				Yes No N/A Yes No N/A
Standards expired	1?			······································	Ves No N/A
					Yes No N/A
Comments:					

3. BLANKS (Levels B, C, D, and E)	
Calibration blanks analyzed? (Levels D, E)	Yes No XIA
Calibration blank results acceptable? (Levels D, E)	Yes No (N/A)
Laboratory blanks analyzed?	
Laboratory blank results acceptable?	
Field/trip blanks analyzed? (Levels C, D, E)	Yes(Ng) NA
Field/trip blank results acceptable? (Levels C, D, E)	Yes No (N/A)
Transcription/calculation errors? (Levels D, E)	Yes No N/A
Comments:	NO FB
4. ACCURACY (Levels C, D, and E)	
Surrogates/system monitoring compounds analyzed?	Yes No N/A
Surrogate/system monitoring compound recoveries acceptable?	Yes(No) N/A
Surrogates traceable? (Levels D, E)	Yes No No
Surrogates expired? (Levels D, E)	Yes No N/A
MS/MSD samples analyzed?	Yes) No N/A
MS/MSD results acceptable?	Yes No NA
MS/MSD standards NIST traceable? (Levels D, E)	Yes No (NA)
MS/MSD standards expired? (Levels D, E)	Yes No N/A
LCS/BSS samples analyzed?	
LCS/BSS results acceptable?	Yes) No N/A
Standards traceable? (Levels D, E)	Yes No NA
Standards expired? (Levels D, E)	Yes No N7A
Transcription/calculation errors? (Levels D, E)	Yes No (N/A)
Performance audit sample(s) analyzed?	Yet No N/A
Derformance audit cample results acceptable?	Yes No NXA
Comments: 73 + 74 — surr Olo — J	all
	NO THS

5.	PRECISION (Levels C, D, and E)	
Dupl	licate RPD values acceptable?	Yes) No N/A
Dupl	licate results acceptable?	
MS/I	MSD standards NIST traceable? (Levels D, E)	Yes No WA
MS/I	MSD standards expired? (Levels D, E)	Yes No N/A
Field	d duplicate RPD values acceptable?	Yes(Na) N/A
Field	d split RPD values acceptable?	Yes No (N/A)
	nscription/calculation errors? (Levels D, E)	
	nments:	
6.	HOLDING TIMES (all levels)	
	nples properly preserved?	
Sam	nple holding times acceptable?	( Yes) No N/A
Con	nments:	
	`	

8. COMPOUND IDENTIFICATION, QUANTITATION, A	AND DETECTION LIMITS (all
levels)	
Results reported for all requested analyses?	
Results supported in the raw data? (Levels D, E)	
Samples properly prepared? (Levels D, E)	/ \
Detection limits meet RDL?	(Yes) No N/A
Transcription/calculation errors? (Levels D, E)	Yes No N/A
Comments:	
9. SAMPLE CLEANUP (Levels D and E)	
Fluoricil ® (or other aborbant) cleanup performed?	
Lot check performed?	Yes No N/A
Check recoveries aceptable?	Yes No N/A
Check materials traceable?	
Check materials Expired?	
Analytical batch QC given similar cleanup?	Yes No N/A
Transcription/Calculation Errors?	
Comments:	<u> </u>

# Appendix 6

Additional Documentation Requested by Client

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

Report Date: February 18, 2014

Page 1 of 2

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder: 342714

Client SDG: XP0049

Project Description: RC-232 Soil

•	mem ob or				•	•						
Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
Diesel Range Organics Batch 1366736							talanda (militaria) (managana militaria)					
QC1203036055 LCS Diesel Range Organics (C10-C20)	66600				53800	ug/kg		80.7	(70%-130%)	BYT1	02/16/1	4 13:10
Motor Oil (C20-C36)	66600				57900	ug/kg		86.9	(70%-130%)			
**o-Terphenyl	666				537	ug/kg		80.6	(50%-150%)			
QC1203036054 MB Diesel Range Organics (C10-C20)				U	2160	ug/kg					02/16/1	4 12:31
Motor Oil (C20-C36)				U	2160	ug/kg						
**o-Terphenyl	666				513	ug/kg		77.1	(50%-150%)			
QC1203036058 342714006 MS Diesel Range Organics (C10-C20)	67600	DJ	80900	DJ	156000	ug/kg		112	(70%-130%)	ı	02/16/1	4 20:57
Motor Oil (C20-C36)	67600	D	1270000	D	1560000	ug/kg		N/A	(70%-130%)	ı		
**o-Terphenyl	676		0.00		0.00	ug/kg		0*	(50%-150%)	1		
QC1203036059 342714006 MSD Diesel Range Organics (C10-C20)	67400	Dì	80900	DJ	135000	ug/kg	14.5	80.7	(0%-20%)	ı	02/16/1	4 21:36
Motor Oil (C20-C36)	67400	D	1270000	D	1390000	ug/kg	11.8	N/A	(0%-20%)	)		
**o-Terphenyl	674		0.00		0.00	ug/kg		0*	(50%-150%)	)		

#### Notes:

The Qualifiers in this report are defined as follows:

- A The TIC is a suspected aldol-condensation product
- B The analyte was detected in both the associated QC blank and in the sample.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated